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The Farmer's Digest

Volume 15 November, 1951 Number 5

What Has Happened to Our Soil?

Condensed from New Jersey Agriculture

Dr. Firman E. Bear

Rutgers University

WHEN Captain John Smith landed in Virginia in 1607, the United States was inhabited by some 800,000 Indians. Each Indian had 2,400 acres of land at his disposal. Today, 344 years later, with a population of more than 150 million, the amount of land per person has been cut to 12 acres. Over half of this is desert, water or waste.

Our European ancesters had never before seen corn, potatoes, tobacco, peanuts, or tomatoes. They tested these Indian crops, found them good, and set about growing them. Cotton, another crop with which they had had no experience, grew well in the South. Before anyone realized it, we were planting 150 million acres of these crops every year. These new crops were all grown in rows. So we plowed the land, planted the crops, and cultivated them, and we developed the most destructive type of farming the world has even known.

Our people are mechanical minded. The horse and his manure virtually disappeared. The 2,000 tractors of 1910 grew into 3½ million by 1950. Fences, the Maginot Lines against erosion, were torn out to make longer fields, which meant a longer sweep of wind and water. Dust storms developed. Great gullies were formed. Harbors were filled with mud. Reservoirs were choked with fertile topsoil at the rate of 1 to 3 per cent a year.

The handwriting of erosion was plain to see. The Soil Conservation Service was organized. Strip cropping, contour farming, growing of sod crops, and planting of forests, got under way. But not before some 50 million acres of good land had been ruined.

In 1607 all the land east of the Mississippi except the prairies in

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New Brunswick, N. J. July–August, 1951

northern Indiana and Illinois, was covered with trees. A squirrel could have gone from Maine to Louisiana by jumping from one giant tree to the next. These trees were cut down, burned, and done away with as rapidly as possible.

One would have thought the soil was very fertile. But the organic matter was soon used up. Then we discovered that the soil, having been leached with the rains of centuries, had lost all its soluble substances out to sea. We soon had to use lime and then fertilizers. Last year we applied 45 million tons of fertilizer, enough to fill a line of 40-ton freight cars extended four times the distance between New York and San Francisco.

In some areas we had to use magnesium; in others, sulfur, and in others, iron. Soon we also needed iodine, cobalt, copper, manganese, zinc, boron, and molybdenum. Take molybdenum, for example. We had great difficulty developing molybdenum deficiency in water cultures. When we did, we found it could be cured by adding 1 part molybdenum to 1 billion parts of solution. Yet that same year a farmer in New Jersey had to plow under 45 acres of cauliflower because the soil was too low in molybdenum to produce heads.

The Soils Departments of the Agricultural Experiment Stations of New Jersey and the 47 other states and the U.S.D.A. are the guardians of the nation's land. To us is given the obligation of seeing that the soil is conserved and made increasingly productive, so that our increasing numbers can continue to enjoy the fruits of the earth in abundance.

Two Lamb Crops A Year

Condensed from the Rural New Yorker

F. X. Gassner

For many years the commercial sheep breeder has been, and continues to be, interested in the problem of increasing the productivity of the breeding flock. This problem is of considerable economic importance in several respects. Foreign wool production and the competition of various domestic livestock ventures have been responsible for a drastic fall in the number of sheep in the

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333 West 30th Street, New York City, Sept. 1, 1951

United States. The sheep population declined from 52,000,000 head in 1942 to approximately 31,000,000 head in 1949, while the demand for meat and wool has remained high.

In many parts of the country, it would be a distinct economic advantage to the farmer to have his ewes breed during either Spring or Summer instead of the usual Fall or early Winter.

The majority of sheep breeds and types have a gestation period of five months. Aside from the care needed during the nursing period, the ewes must be maintained by the farmer during the remainder of the year, when they are in a quiescent or non-productive state. Therefore, the possibility that ewes can be bred again during the same year should be attractive to the breeder for obvious reasons. Because of these and other considerations, the sheep has been, of all domestic animals, the subject of most intensive studies in the physiology of reproduction. This is particularly true with respect to stimulating sexual heat and causing ovulation or egg production in the female sheep during its anestrous or normally quiescent period.

Such studies are especially pertinent as they concern those breeds of sheep most frequently found in American flocks. While certain breeds of sheep such as the Dorset and the Merino breeds, including the Rambouillet, may show periodic heat during the entire year, most breeds exhibit breeding heat periods only during the Fall.

As a rule, sheep in the West begin coming into heat for the first time during the season around the forepart of August, and continue with periodic heat periods about every 17 days until January. Periodic heat cycles are usually terminated either by pregnancy or by other factors such as climatic or certain physiologic and chemical reactions which bring on the quiescent or anestrous interval.

The entire sequence of cyclic heat, ovulation, pregnancy, and anestrum are normally controlled automatically by chemical regulators or hormones. These substances are produced by the ductless glands within the body. There is considerable evidence available which supports the belief that climatic variations, such as temperature and light, likewise play an important role in initiating and terminating the periodic heat cycles. It is a common observation by shepherds that the consistent drop in night temperature in the Fall will bring about a greater intensity in the occurrence of sexual heat in ewes. While there seems to be a relationship between the change of hot weather to cool weather and the occurrence of heat in the ewes, the fact that the

period of light during the day is definitely shorter in the Fall than in the summer also seems to influence the heat cycle in ewes. Experiments conducted in England and at the USDA's Agricultural Research Center at Beltsville, Maryland, have shown that the time of breeding for ewes can be reversed by means of artificial light. This was done by exposing the ewes to 18 hours of artificial lighting each day from the middle of December to the last of March. When the hours of artificial lighting were reduced to six hours per day, 14 ewes bred during this period of reduced lighting and produced lambs the following Fall.

Armour and Company, with the technical help of the writer, was successful in obtaining two lamb crops in one year by means of hormonal treatment. This preliminary field trial was made possible because Armour and Company provided animals, facilities and funds. There were 322 ewes selected at random from a large flock at lambing time, which were treated with various doses of hormones at varying intervals after lambing. A total of 127 lambs was produced besides the regular spring lamb crop. One particular group of 100 ewes, treated at a certain time after lambing, dropped 64 fall lambs. A control group not treated with hormones, produced only one lamb.

While the results of this preliminary experiment are most encouraging, and indicate that the production of a second lamb crop after lambing within one year is feasible, a number of important questions have to be answered before recommendations can be made for practical application by sheepmen. First of all, this field trial must be repeated with a larger number of animals to see whether the results will be reproducible and consistently good. This, of course, will depend upon the choice of the proper type of hormone, the most favorable time of injection after lambing, the proper size of dosage employed, and the number of injections given. All this is necessary in order that the ewes can be brought into heat with subsequent fertile mating and successful development of lambs.

One of the most important questions is whether a ewe will be able to stand up under the stress of producing two lamb crops per year. Aside from the need for more feed, equipment and labor during such an intensive breeding program, the reproductive life of a ewe may be considerably shortened. Furthermore, it has not been determined as yet whether ewes will continue to breed spontaneously during Fall or Winter following the second lambing during Summer or

Fall, or whether further hormone treatments would be necessary to have such ewes come into heat during the regular breeding season. It is clear that these animals will require being kept on a higher nutritional level throughout the year.

It appears, at present at least, that the practical application of producing two lamb crops would be limited to farm flocks of between 50 and 250 ewes, and perhaps to a few range sheep operations which can provide sufficient feed, equipment and help to handle the ewes under the two-crop lamb program.

Armour and Company, in cooperation with the Colorado A & M College Experiment Station, is continuing investigations to answer these questions. A thousand ewe lambs are, at the present time, on test in Illinois in order to study these animals during their reproductive life under field conditions. Moreover, the Colorado Station, in cooperation with Armour, has initiated a similar experiment with 600 ewes in Colorado.

These experiments are designed: first, to try to produce two lamb crops; second, to solve the problem of the choice of hormone, the dosage and timing of injections; third, to investigate feed and management problems; fourth, determine the effect of such treatment on the reproductive life of the ewe; and fifth, to determine any effects such treatment may have on the ability of the lambs to produce meat and wool economically.

The judicious use of hormones to bring ewes into heat to make them ovulate, and to cause a subsequent normal development of a lamb, suggests at least three possible ways by which lamb production can be increased during the year.

The first means consists of the production of a second lamb crop, which has been discussed.

The second possibility concerns the treatment of ewes that failed to breed normally during the Fall, and therefore remained barren during the year. Exact information is not available as to the number of dry ewes present in the average farm flock, but it will amount to at least 5 per cent and may be higher. It appears possible that, with good feeding and management practices, and with the intelligent use of hormonal treatment, the number of barren ewes can be reduced to less than one per cent. This would, of course, necessitate identification of the ewes which failed to breed by means of breeding harnesses on rams or by painting the brisket of the rams with colored oil.

A third means to increase lamb production would be to produce

off-season or fall lambs. Ordinarily ewe lambs are not bred until the age of 18 months and they are about two years old when they drop the first lamb. It is theoretically possible to bring ewe lambs into heat at 12 months of age, or in the Spring, so that they lamb in the Fall. Such fall lambs would be ready for market during the following late Spring or early Summer when the lamb market has fewer lambs to offer and the price is, therefore, most favorable.

Fall or Spring Freshening?

Condensed from the Guernsey Breeders' Journal

Professor George W. Trimberger
Cornell University

THE desirability of fall freshening for economical production is always indicated regardless of whether the answer is obtained from research at the colleges, from Dairy Herd Improvement results, or from reports originating in foreign countries. The cows freshening during the fall, in October and November, always have an advantage and there is a gradual decrease in total production and net income until a low is reached for those freshening in the spring during April and May. The advantage usually is from 500 to 1200 lbs. of milk.

There are many factors involved which have to be considered in thinking about this problem. They include total production obtained, cost of production per 100 pounds of milk, income over feed cost, price of milk prevailing during different seasons of the year, possibility and advisability of changing from spring to fall freshening, kind and amount of pasture available during late summer and extra labor required in milking and caring for cows recently fresh, as well as how these labor requirements fit in with the other farm operations or work. In some areas, the demand for milk in the fall may also be an important factor.

It is well established that milk can be produced for less on pasture. The season of lush pasture is a period for economical production. However, it is also recognized by most breeders that during the flush spring season, the price for

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milk is lower than any other time during the year. This is a local variable that can be checked by each breeder. The percentage of the total annual feed supply produced by pasture for the fall freshening cows is usually about 23 per cent as compared to 35 per cent for spring freshening cows. The percentage of concentrates making up the total yearly feed supply is about 33 per cent for fall freshening cows and 21 per cent for those freshening in the spring.

Finally, when all these factors are combined, the relation of season of freshening to production per cow in New York Dairy Herd Improvement herds shows that the total feed cost for an average cow is $17.00 more per year when she freshens in fall as compared to spring. Thirteen dollars of this is due to cost of grain. However, the value of product is worth $43.00 more which gives an advantage of $26.00 for added income over feed cost in favor of the fall freshening cows. This amount per cow over a 10 year period reaches quite a sum for either a small or large herd. In addition, the labor situation on most farms is such that labor can be utilized more effectively and efficiently with fall freshening cows. More attention is necessary during the time of parturition and during the first four months of the lactation until cows are again bred back for the next lactation.

A cow's inherent ability to produce persistently and on a high level is the same regardless of whether she freshens in the spring or in the fall. The difference is in the environment. The latter includes feed, management and other conditions such as unfavorable temperatures and trouble from flies which may prevail during the summer months. The effect is often indirect and may be due to taking the edge off a cow's appetite for heavy feed consumption.

Fall freshening cows will get a special stimulus for higher production when they go on pasture during the spring months. This time coincides with the stage in the lactation curve when a natural decline ordinarily would take place. A sharp up turn in daily milk production is often observed when such cows are turned on flush and stimulating pastures which are very luxuriant in early summer. The spring freshening cows get this stimulation from flush pastures too early in their lactation to profit to the same extent as do fall freshening cows. The cows freshening in the spring often show a depressed lactation curve due to short pastures in July and August which catch them during the early part of their lactation curve when they should be making their heaviest production. Fall

freshening cows are on the last month of their lactation when pasture slumps occur and their needs for nutrients are at a low point.

An important question in changing the time of freshening in cows is the optimum length of lactation period and length of dry period. It is now generally recognized that the most practical production and the greatest lifetime production can be obtained from a 10-month lactation period with a calf each year, if possible. The optimum length of dry period is a question that is closely associated with the length of lactation. The desirability of a rest period between lactations in which a cow may recuperate strength, put on flesh and store reserve minerals and vitamins is generally accepted. Investigations conducted by John W. Klein and T. E. Woodward of the United States Department of Agriculture showed that a dry period of two months was the optimum-length for cows and calving at 12 month intervals. Either a longer or shorter dry period reduces the total life-time milk yield, the longer because more milk will be lost in the current lactation than would be gained in the following lactation and the shorter because more milk would be lost in the following lactation than will be gained in the current lactation.

It is obvious that the longer the lactation period beyond 10 months, the less the total lifetime production and this is an important factor to consider in postponement of breeding to get cows calving during a certain season. Recent work by W. J. Tyler and George Hyatt, Jr., at West Virginia University shows that it is a poor policy to have cows calve 11 months or less from the previous date. All their information indicates that for maximum production and reproductive efficiency it is advisable to have cows calve every 12 or 13 months. They found that there was nothing gained by shortening or lengthening the 12-month period between calvings since a period of 10 months lactation gives the best efficiency for production.

When all factors are considered it becomes evident that fall freshening for cows and heifers is desirable. However, before considering a wholesale switch to fall freshening within a herd there are certain factors which have to be considered. One of these is that it is not advisable to breed cows back before they have been fresh at least 60 days. Any service given before 60 days following the previous calving gives a poor rate of conception and often results in poor reproductive health for the cow bred this close. Based upon research at Cornell, Illinois, Kentucky, Wisconsin and other stations, definite recommendation is

made that it is not practical to breed during the first 60 days after calving even when fall freshening is desired. However, any time after 60 days is a satisfactory time provided the cow did not retain the placenta or have an infection at the previous calving. This may permit moving backward toward fall freshening by a month if conception occurs at the first service.

If the time interval from calving to the first service following calving is too great, it may be more difficult to get cows with calf. To avoid or guard against poor breeding efficiency it usually is best to move the calving time of cows several months from the normal each year until the proper time in the fall is reached. If a change of six months or more is attempted at one time, there is considerable risk involved in getting a desirable breeding efficiency. In addition, so much production is lost that the advantages for fall freshening are not great enough to overcome the difficulties involved in getting on this schedule.

During September and October, the cows which have been bred several times previously should be given a sexual rest period without service. This will often provide the opportunity for them to get into a reproductive state of health for successful breeding. If this is accomplished, they will freshen at a time so they can be bred for fall freshening the next year.

The greatest possibility of getting a fall freshening dairy is through the heifers that enter the herd. By controlled feeding and management it is relatively easy to have heifer calves born any time during the year freshen the first time within a period of three months in the fall. This starts them on a fall freshening schedule and many of them can be carried through a long time for this seasonal freshening.

Size in heifers should determine breeding time rather than age. Age is a fixed factor but size can be controlled by the human element with changes in kind and rates of feeding. This suggests the possibility of starting the majority of heifers in the fall for their first lactation and then keeping as many on this schedule as is possible. The decision can be made at an early date during the calf's life whether it is best to feed heavily for rapid growth and breed at a young age or to feed less, raise the calf slowly and breed at an older age but at the same size. By employing either method, depending on the birth date of the calf, it is possible to get nearly 100 per cent fall freshening for the first lactation.

No doubt there are some who are somewhat dubious regarding this approach. However, recent

experiments at Cornell give a splendid demonstration that rates of feeding have a marked effect on sexual development and activity in heifers as well as on body size. When the feeding rate is started at an early age during the calf's life, it is relatively easy to affect sexual and body development in a heifer and reach the desired stage so the heifer can start on a fall-freshening schedule. Whether to accelerate or retard the development by heavy or light feeding depends entirely on the breed and the time of the year the calf is born. However, accelerated feeding schedules should not be so heavy that the heifer becomes coarse. Nor should low nutrition levels be so low that marked retardation is experienced.

The next question that presents itself is how many cows will continue on a fall freshening schedule once they start on this as either young or older cows. This depends to a large extent on the breeding efficiency that prevails in the herd. Some herds maintain the same seasonal freshening schedule year after year and others change about almost entirely within a few years. By following recommended procedures for a high reproductive efficiency it is possible to keep the herd on a fall freshening schedule year after year. The first requirement for this is to get a high fertility level for the bulls and cows in the herd. This calls for a conception rate of about 60 per cent or six out of 10 cows conceiving on the first service and 80 per cent pregnancies from the first three services for the various females in the herd. Since a considerable number of herds do not have the high breeding efficiency necessary to keep the herd on a fall freshening schedule, it is not uncommon to find many herds which start on a fall schedule but in a few years have a spring freshening herd. Others with a higher breeding efficiency will average 13 months from one calving to another for the cows in their herd, but have many cows calving within the year so that the shift away from fall freshening is not serious.

The recommended procedures for keeping or changing cows on seasonal freshening is as follows: Cows calving during September, October, or November are bred back as soon as possible after the cows have been fresh 60 days. At least 80 per cent of these cows should continue as fall freshening cows. Cows calving during December, January and February are also bred back soon after they have been fresh 60 days. This should keep the majority of them on a mid-winter calving schedule.

The group freshening during the spring months of March, April and May are also continued on

this schedule if normal conception occurs. However, if a breeder or dairyman has an older sire of lower fertility, it is advisable to use him on this group as some delayed conceptions here will not be serious and can be used to change to fall freshening cows in another year. Cows in this group which do not conceive readily can be given a sexual rest period without service for two or three heat periods, and bred to calve during June, July or August next year. It will then be easy to change to fall freshening the following year.

It is advisable to withhold breeding to cows calving during June, July and August. By postponing service to these cows until the heat following November 22, they will move to a calving schedule in September, and they can then continue in the fall calving schedule. By following this procedure it should be possible to move about as many cows into the fall freshening group as are lost out of this group each year. This will tend to keep the numbers constant in this group and the heifers added will gradually build up the numbers for fall freshening in a herd. Since a sexual rest period during which time service is not allowed is often beneficial to get conception in difficult breeders, it is also a good procedure to give this rest to cows which are difficult breeders during the summer months and thus change them to fall freshening cows at the same time.

It is now recognized that very few cows get acetonemia during the time they are on good pasture. Many cows that have been subject to severe cases of acetonemia will retain some damage to their liver and thus are more apt to have acetonemia recur during subsequent lactations. For these cows, especially if they are valuable cows, it may be an advantage to try for spring freshening during the good pasture season.

Dairymen will always have some good cows freshening in the spring. For these cows a program of feeding should be followed in which pastures are supplemented to insure full production. This problem has been worked out in different ways by dairymen. Improved pastures are helpful, especially when combined with scientific pasture management. Others use legume meadow aftermath as pasture and often annual green crops such as sudan grass, oats, or soybeans are very helpful. Many have used hay crop silage with excellent results. This system preserves the pasture in the silo from the flush season to the opposite one of pasture scarcity at which time the pasture equivalent feed is taken from the silo. During the past several years the possibility of

using an overhead sprinkling system for irrigating or watering pasture land has received considerable thought and attention. Eventually this may help to solve the problem and avoid the marked decrease in production for the cows which freshen during the spring season of the year. Any pasture management program to maintain young lush pasture growth of high digestibility will help narrow the gap between fall and spring freshening cows.

Stretching the Grazing Season

Condensed from Ohio Farm and Home Research

R. R. Davis

With a little cooperation from the weather, some Ohio farmers can have productive pastures for their livestock eight months of the year. It is asking too much to expect adequate pasture during the months of December, January, February and March under average Ohio conditions. However, the vitamin A activity of the milk from a dairy herd may be increased by their having limited access to some green pasture such as rye during the months of December and March.

Providing for an eight-months pasture season is not an easy task. Managerial skill, agronomic know-how, and cooperation from the weather are all necessary to reach this goal. No one pasture can be expected to carry the load. Several pasture plants and mixtures are required to provide feed over so long a period.

Most Ohio farms have some acreage in bluegrass. Depending on the treatment it gets, bluegrass can be a productive pasture or an "exercise lot". The productive period of bluegrass can be lengthened as well as over-all production increased by introducing a suitable legume. In addition, the protein content of the pasture forage is increased by the legume, particularly during the summer months when bluegrass is low in nutritive value. This is an important factor for dairy animals and sheep.

An adequate supply of lime, phosphorus, and potash is necessary before a legume can be main-

Reprinted from Ohio Farm and Home Research
Wooster, Ohio, May–June 1951

tained in a bluegrass sod. An initial treatment of 400 to 500 pounds per acre of 0-20-0 or 0-20-10 should ordinarily be made in the seedbed when establishing permanent pastures. Annual applications of 200 to 300 pounds per acre of 0-10-20 or 0-20-20 are desirable where it is expected to maintain a consistently good stand of Ladino clover in the mixture. Even with adequate lime and fertilizer, alfalfa and red clover cannot be maintained in a permanent type pasture. Birdsfoot trefoil and Ladino clover have been most successful in combination with bluegrass.

Bluegrass fertilized with nitrogen in the fall or early spring is ordinarily ready to graze ten days to two weeks earlier in the spring than that not fertilized with nitrogen. Some dairymen object to turning the herd out so early, but the early grass could certainly be utilized by beef animals or sheep. Nitrogen also increases over-all production, but the amount of summer grazing is not materially increased. Bluegrass fertilized with nitrogen in late August or early September stays green and active later in the fall than it does when not fertilized. Thus the grazing season can be stretched about two weeks on each end by fertilizing bluegrass with nitrogen. However, bluegrass grazed heavily in the fall will be slow starting in the spring. The same area should not be used for late fall and early spring grazing. The use of nitrogen on bluegrass discourages clover by increasing the competition from the grass. Control of the grass by grazing and clipping favors clover in the mixture. Inadequate supplies of lime, phosphorus and potash will result in the loss of clover.

The bulk of the season's grazing load can be carried by lush grass-legume meadows. Some of the most successful dairy farmers in Ohio depend almost entirely on such mixtures for pasture, silage, and hay. Mixtures such as alfalfa-Ladino clover-bromegrass and Ladino-orchardgrass have a long productive season. Both give good summer growth, when other pastures are likely to be in short supply.

Meadow mixtures require high fertility for high production and long life. A seeding application of 400 to 500 pounds per acre of 0-20-10 and annual applications of 200 to 300 pounds of 0-10-20 or 0-20-20 are recommended. Manure can replace some mineral fertilizer, particularly potash, on any grazing area. Heavy applications of manure should be confined to fall or winter so that the animals do not reject the manured forage.

A Ladino-orchardgrass mixture begins growth early in the spring.

It is ready to graze about the same time as bluegrass. However, orchardgrass does not form the heavy sod typical of bluegrass and for this reason is not so well adapted to grazing during wet spring weather. Because of its early and rapid spring growth and its unpalatable nature when approaching maturity, the management of orchardgrass offers a problem. Heavy grazing and clipping are necessary to keep it palatable and to prevent it from smothering out Ladino clover. Since it matures early, orchardgrass is not adapted for first-cutting hay. Likewise, it is not compatable with alfalfa because it reaches the hay stage when alfalfa is so immature that the stand is likely to be injured if cut for hay. Ladino clover looks like the best legume to use with orchardgrass. The acreage of Ladino-orchardgrass should be kept small enough so that the first growth can either be grazed or taken off for grass silage.

Common timothy gives little aftermath for summer grazing. On the other hand, Marietta timothy has been observed to give good aftermath growth. Timothy is the favorite grass to use with alfalfa for first-cutting hay. Marietta timothy offers the possibility of using timothy in hay mixtures and still having good aftermath growth for grazing.

Alfalfa-Ladino-brome is the "backbone" of many grassland farms. This mixture is hard to beat for quality, palatability, and productivity of hay, silage, and grazing. High fertility and good management are essential for success.

Cutting alfalfa for hay or silage later than the middle of September is likely to cause loss of stand. Although moderate grazing of alfalfa in the fall is less damaging to stands than mowing, the safest practice is to restrict fall grazing of alfalfa to those fields that are to be plowed the following spring. Ladino clover and birdsfoot trefoil offer greater possibilities for fall grazing. The nature of their growth makes it difficult for grazing animals to remove all the leaves from these legumes. The remaining leaves allow for the manufacturing of food for the formation of root reserves. Regardless of the plant in question, high fertility and good soil drainage reduce the danger of stand loss by grazing in the fall.

Rye seeded the first to the middle of September should be ready to graze the latter part of October. The weather is usually such that it can be grazed through November. During a normal winter, little grazing is possible until April, when rye is more productive than the preceding fall.

Wheat planted early on fertile soil so that it makes good growth

in the fall may be grazed lightly in early spring without seriously injuring the wheat. In fact, where grazing prevents wheat from lodging, the yield may be increased.

There are few Ohio farms where grazing of small grains is practical. On heavy or poorly drained soils the damage to the soil from animals tramping overshadows any benefit from grazing.

When a shortage of summer pasture is foreseen, Sudan grass can be used as an emergency measure to fill the need. However, precautions should be taken to prevent any possible chance of poisoning before turning the stock on a Sudan grass pasture.

Another possibility for good quality temporary pasture is fast-growing southern type alfalfa. When planted early in the spring and well fertilized, the southern types of alfalfa, such as Arizona common, New Mexico common, or Hairy Peruvian, make a good growth the first summer. However, the southern type alfalfas are seldom winter hardy and should not be used in mixtures for hold-over pastures or meadows.

Grazing Calendar. Variations in the weather make it impossible to have a grazing schedule that will work every year, particularly on each end of a long grazing season. If we consider the "average" year, the following schedule should be possible under the conditions specified:

APRIL—

Graze rye or rank wheat (only on light, well drained soil); nitrogen-fertilized bluegrass; or Ladino-orchardgrass.

MAY AND JUNE—

Graze improved bluegrass; meadow mixtures (Ladino-orchardgrass, alfalfa-Ladino-timothy; Ladino-brome; or similar mixtures); harvest excess forage for hay or silage.

JULY AND AUGUST—

Graze meadow aftermath; birdsfoot trefoil-bluegrass.

SEPTEMBER—

Graze bluegrass; mixtures containing Ladino clover and birdsfoot trefoil.

OCTOBER—

Graze bluegrass; meadows to be plowed.

NOVEMBER—

Graze bluegrass; rye (only on light, well drained soils).

Antibiotic Speeds Calf Growth

Condensed from Successful Farming

SAVING a bigger share of your calves from scours and getting them off to a faster start are two possibilities that lie just around the corner. And, like the successes scored with hogs and poultry, this new development for calves hinges on the feeding of an antibiotic in calf rations.

Earlier tests had not been too encouraging, but latest research at several of our experiment stations has turned forlorn hopes into an exciting possibility — something that may save millions of dollars annually for dairymen of the United States.

Grew faster, scoured less. Just reported are two experiments conducted at the Iowa Agricultural Experiment Station. The first trial, lasting from the time the calves were 4 days old until 60 days of age, showed that the two lots of calves fed aureomycin gained faster and had less trouble with scours than calves getting none in their rations.

The group receiving whole milk and aureomycin gained an average of 62 pounds, while the calves getting whole milk without aureomycin gained only 47 pounds. In the same manner, calves getting reconstituted skim milk and aureomycin made an average gain of 68 pounds, compared with 58 for the group getting the reconstituted milk without aureomycin.

Scouring was less frequent, and the calves looked better, when the rations contained aureomycin.

The second experiment, lasting from the 4th to the 116th day of the calves' lives, again came out markedly in favor of the aureomycin. The calves getting aureomycin in their milk (both whole and skimmed) gained an average total of 161 pounds during this 112-day feeding test, while calves getting no aureomycin gained an average of only 122 pounds. That's 39 pounds in favor of aureomycin.

Favorable reports also are coming from Cornell University (New York Agricultural Experiment Station). Work with 30 Holstein calves showed that those getting aureomycin, either in whole milk or whole milk substitutes, gained 1.15 pounds daily, compared with .94 of a pound daily for calves getting no antibiotic. This means that a calf between 1 and 2 months of age would weigh 10 to 12 pounds more than another calf of the same age not getting the

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Des Moines, Iowa, August, 1951

aureomycin. Fewer calves scoured when fed aureomycin, and the scouring was less severe. On top of that, calves fed antibiotics ate 40 percent more concentrate and required less nutrients for a pound of gain.

The aureomycin was added to the whole milk or milk substitute at the rate of 10 grams per ton of feed.

Tried in dry feed. Louisiana State University dairy nutritionists have been mixing 2 percent of an aureomycin supplement with dry calf feed (19 percent protein). Feeding of this dry calf feed was started when calves were 8 days old, and continued as long as the 20th week of the calves' lives. Whole-milk feeding was stopped at 30 days.

Aureomycin-fed calves gained 20 percent faster, although there was no increase in feed efficiency. The calf feed with an aureomycin supplement seemed to stimulate appetite, for the calves ate more. Jerseys showed greater response to aureomycin than Guernseys.

Like the research workers in other states, the Louisiana scientists noted that aureomycin helped to prevent scouring. During the first 30 days, while whole milk was being fed, there was scouring among all the calves in the experiment, but less among those receiving aureomycin in the dry feed. After milk feeding was discontinued, scouring dropped off 70 percent among calves receiving the aureomycin, whereas scouring fell off only 20 percent among the others.

An aureomycin supplement seems to be just as satisfactory as pure aureomycin in promoting calf growth. These research workers have tried it both ways. A bacteriological study of the rumen of calves fed aureomycin revealed no change in the microflora, so the conclusion has been reached that the antibiotic actually does its work in the intestine, as with baby chicks.

Doesn't help mature cattle. Often asked is the question of whether antibiotics would benefit mature cattle, or whether the antibiotics would tend to destroy the beneficial bacteria in the paunch or rumen of older cattle.

Louisiana workers have been adding 2 percent of an aureomycin supplement to the feed given to milk cows and bulls. So far, no digestive disturbances have been reported and the animals have not gone off feed. There is no evidence that the antibiotic destroys any of the beneficial organisms in the rumen. On the other hand, no particular benefit has been noted from feeding the antibiotic to these older animals.

Other antibiotics, such as terramycin, bacitracin, and tyrothricin, now are being tested. Many scien-

tists still doubt whether much can be gained eventually through feeding antibiotics to calves. However, others believe that, even though we never attain what has been demonstrated for hogs and poultry, these experiments are opening the door to some extremely interesting and profitable possibilities for the practical dairyman.

Frozen Stuffed Chicken

Condensed from Everybody's Poultry Magazine

Helen Mavis Neal

FROM the egg to the stuffed chicken is the program carried out at the A. M. Wadsworth farm, Wolcott, N. Y. On this poultry farm there is a frozen food plant where chicken stuffed with dressing, vacuum packed and ready for the oven, is prepared. The Wadsworths are the originators and exclusive packers of this product.

The Wadsworths have raised chickens for about 20 years and have maintained their frozen food plant for six years. Before 1946 they worked seasonally, processing plain frozen chicken as well as berries of various types, but before building the freezing plant they investigated to find out why women did not roast chickens except for special occasions and holidays. They learned that housewives just did not want to take the time necessary to prepare stuffing and dress the fowl, so instead they roasted pork and beef which could be seasoned and put into the oven with no more fuss.

With this in mind the Wadsworths developed a product that was bound to be welcomed by career girls, club women and the inexperienced bride, and which could be prepared with the same ease as other meat roasts.

Located in a roaster-raising area where the shortage of red meat has increased the demand for chicken, this plant sought the easiest and fastest way to prepare fowl to compete with red meat products. It was then that their new idea originated. They at once began making their own machinery for the processing of stuffed birds and now they supply several outstanding frozen food

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Hanover, Penna. September 1951

distributors from Boston to New York and as far west as Chicago. They have even had requests from Sweden and Holland for information on the process and the new product's potentialities grew so fast that the plant offered year-round work.

The process itself is interesting. Chickens are first hung on shackles by the legs, killed, bled, and then run through a scalder where they are sprayed with hot water. Individual birds are then held over a picking machine which removes feathers in a few seconds.

Birds then go to the pinning table where pin feathers are removed by hand, and the head, feet, and crop removed. After this, they are placed in a huge vat of ice water to cool. From the vat they go onto a 20-foot, 44-pan chain belt. (The belt is a series of aluminum tray-like pans hooked together which are washed with each revolution.) Women workers lining the belt then perform various tasks. One cuts around the vent, another pulls out viscera, three women using lung hooks take out lungs, bronchial tubes, and kidneys, and one cuts the gizzard. The gizzard, heart and liver then go to a special table where they are chilled, washed, and thoroughly inspected.

Now having passed the length of the belt, the birds are carefully inspected and the perfect birds are placed on shackles by the wings and run through an automatic singer. They then go into the automatic washer where the force of sprayed water spins the birds, washing them well.

Chickens then follow along a 50-foot drying area, after which they are taken off the shackles and the necks cut off. They are then placed in colorless plastic bags containing a label and directions for cooking. After being bagged, birds go to the stuffer and are filled with a special dressing, weighed, the amount recorded on the label. The bag is pulled tight over the entire bird and the air sucked out by a vacuum hose. Just three hours from the time it was bled the bird is ready for the freezer. When running to full production, about 540 birds can be processed in one hour from this assembly line.

Each bird, weighing about four pounds, is placed on contact plates and sent to the freezing unit. The birds are frozen at 35 degrees below zero for 10 hours. They are then packed four in a case and are ready for distribution. Many concerns send their trucks to the plant, thus eliminating trucking expenses for the Wadsworths and also lessening responsibility for injury to birds enroute to stores.

When the chicken reaches the consumer, preparation for cooking is simple. It is removed from the

bag, sprinkled with salt and pepper, and placed in an oven while still frozen. As it defrosts in an oven preheated to 350° F., it becomes self-basting. Approximately 35 to 45 minutes for each pound is the recommended procedure for cooking.

In 1944 the Wadsworths first began working on the recipe for the dressing. They wanted it to be a composite, universal blend. They started traveling in various sections of the United States, eating and inquiring about dressings in homes and restaurants. They set down a variety of formulas and different methods and materials used.

Upon returning home they made up a number of variations of these recipes, putting them into birds labeled A, B, and C, then served the birds at parties. Each diner was asked to judge the dressing on the basis of consistency, texture, and taste. After three years of such parties and home demonstrations, they had acquired what they believed to be a cross-sectional recipe consisting of chicken giblets, salt, bread, eggs, and spices.

After actual processing began, the Wadsworths were faced with the problem of doing something with the chickens torn and bruised in the process. The result was another new product—chickenburgers. The imperfect chickens are cooked, ground and made into patties.

Two "burgers," weighing about four ounces, are placed in one package and many are sold to local restaurants where they are fried on a grill or in deep fat and served as sandwiches. But they can also be defrosted, mixed with chopped vegetables such as celery, onions, cucumbers, and olives, and with salad dressing or mayonnaise added, can be used as chicken salad. Other uses are as croquettes (made by simply forming into cone-shape, warming and adding a cream sauce). They are also used in macaroni salad, chicken chop suey, and chicken a la king.

These burgers contain cooked meat, bread crumbs, chicken broth, egg, and seasoning. Cooking is done in stainless steel cookers and the bones are removed before forming into patties. About 1800 patties can be made in an hour.

Plans are now being made to equip the plant so there will be absolutely no waste in the entire process. Close to one-third of a bird's weight is lost or about one pound of an average bird will include head, feet, and viscera. Ten percent is blood and feathers alone.

The chicken feet with their nitrogen content will be used in making fertilizer or will be ground together with the heads, blood,

and viscera, and steam-cooked to make mink food. The feathers will be placed in a steam chamber and dried under pressure to form a meal of high protein content, for which there are several uses.

Soup plate concerns now purchase the necks, and the livers are sold in twelve-ounce packages in nearby stores as well as through national concerns. Concentrated broth is also sold. When the plant is fully equipped, no part of the bird will be lost.

The Wadsworths also package cut-up fowl, broilers and fryers, vacuum packed, using only young birds from 12 to 18 months old. Stuffed birds are about four to six months old. These products are also quick-frozen by the contact method and sealed tight so that the 25 percent moisture is not lost during freezing but is preserved to help make a tender cooked bird.

When Wadsworth graduated from college he was a chemist and until 1931 served in that capacity. Later, ill health made it advisable for him to go to the country where he started his chicken business with an 8 x 8-foot brooder house. Recently he expanded his operations to include numerous chicken houses, and the freezing plant.

Good Bulls Are Good Gainers

Condensed from The Farmer

Robert G. Rupp

THE BULL calf that does a good job in the feedlot is getting the nod as a future herd sire on Montana and South Dakota ranches these days.

Ability to gain is proving to be an inheritable factor—one that can be passed from father to offspring. Twenty years of experimental work at the U. S. Range Field Station, Miles City, Montana, has proved bulls that put on pounds as fast as calves turn out "good doing" progeny.

In technical language, "high gaining calves reflect the ability of their sire to influence the gain of his offspring, and individual animals also have the ability to transmit their gaining ability to their offspring."

What does that mean?

It means ranchers have a new measuring stick for picking herd

Reprinted by permission from The Farmer
Saint Paul, Minn. August 18, 1951

sires that will produce fast-growing calves. Because animals with the ability to do well in the feedlot have the temperament to do well on grass.

It means purebred breeders, through use of scales and record book, have an additional aid for raising herd standards.

Records kept by Western South Dakota ranchers the past two winters show calves from the same bull make nearly equal gains in the feedlot. Calves from different bulls may vary. They also show heredity has an increasing effect on rate of growth as calves get older, and that body conformation does not affect growth.

In the tests, eight ranches each supplied one lot of six bull calves from the same sire.

A total of 67 calves from 10 sires went into the same feedlot where they were wintered on a ration of corn, oats, alfalfa and wheatgrass hay with free choice of salt and steamed bonemeal. After a 30-day conditioning period, the calves were type rated according to modern show ring standards, and records started.

Record keeping and feeding recommendations were under the direction of Henry Holzman, South Dakota State College extension animal husbandman. Weight gains were averaged at 140 and 168 days, and calves type rated at end of the experiment.

The study, one of the first of its kind undertaken by ranchers, uncovered a difference between groups, and within groups. While most groups gained about 1.8 pounds per day, one lot did considerably better—2.3 pounds a day for 125 days. Those calves were from the same sire as the high-gaining group of the year before.

Within groups, some calves made good gains; others were below average, which indicates to Holzman that gain factors are passed on by dams as well as sires. Some calves "hit the feedlot and went right to town;" others were "spooky and nervous," which makes temperament an important consideration.

Heredity seemed to have an increasing importance as the calves became older. They grew faster toward the end of the test than they did earlier, despite the 30-day conditioning period at the beginning.

Holzman figures the study "indicated genetic factors influenced the rate of gain 10% during the first 84-day period, 54% the second 84 days and 84% during the third 84 days."

Another important difference showed up. The factor controlling high and economical rate of gain apparently has no connection with body type or conformation. Some animals of show ring quality had the factor, others did not. The

same was true of common, rangy individuals.

In summarizing his two years of study, Holzman says progeny testing is the coming thing in the livestock industry. "It will provide an added factor for sire selection throughout the livestock industry," he predicts.

It can't completely replace common sense standards, however.

"Inherited ability cannot eliminate or lessen the value of type or other selection standards developed over the years, but it does supplement those standards with a real production factor," he points out.

That it has merit is already apparent. Mention in the sales ring that a bull's offspring are better-than-average gainers, and the price goes up immediately. At Miles City, Station bulls are spoken for by ranchers up through 1952.

George Dobesh, South Dakota Hereford Ranch, on whose place the calves were wintered, is already weighing all calves at birth, again at weaning time, and every 28 days through the winter. He also weighs all feed and hay consumed. Cows will be culled according to how their calves wean out, based on two years of records.

Tabulations on 35 two-year-old heifers are already showing some of the poorer type animals that have better gaining and better type calves than their slicker looking sisters.

One of the bulls that went into his herd this spring was picked partly on his looks, and partly on the gain records of his brothers made winter before last during the first test.

Skimpy Wiring Steals Your Money

Condensed from Electricity on the Farm

Morris H. Lloyd
Agricultural Engineer

HAVE you ever turned on a water faucet and noticed that at first the water spurted out with good pressure but soon slowed down? Perhaps the pipe was too small to let the water flow easily, or maybe the distance back to the pump was so great that most of the pressure was used up overcoming friction in the pipe.

No pipe, not even copper tub-

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ing, is perfectly smooth inside. As water flows the roughness of the inner surface causes friction. This friction resists the flow of water and it takes pressure to overcome it. The longer the pipe, the greater the amount of this friction loss or drop in pressure. Also, for any particular size of pipe, the faster we try to draw water through it, the more pressure is used up.

Most of us are familiar with these facts and we wouldn't think of installing a one-half inch pipe several hundred feet from a pump in the house out to a dairy stable to supply automatic water bowls for several dozen head of stock or to provide some fire protection. Such a pipe would hardly be large enough to supply one faucet at any considerable distance. Yet we often give our wiring system similar jobs and wonder why equipment doesn't work as it should.

Electricity flowing through a wire acts very much like water flowing through a pipe. We can't see the electricity, but we can see what happens to the electrical equipment. And we can measure it, even though we can't see it. But instead of measuring the flow of the current in gallons per minute, we measure it in amperes, and we measure the pressure in volts instead of pounds.

Wires, like pipes, are made in many sizes. These sizes are listed by numbers, but the largest wire, has the smallest number! For instance, No. 14 wire is the smallest size used in the permanent wiring of buildings. Next in size to No. 14 is No. 12. No. 14 and No. 12 are the sizes commonly used to supply most lighting and appliance outlets. Next larger in size is No. 10, then Nos. 8, 6, 4, 2, 0, 00, 000, and 0000. These larger sizes are used to carry current between and into the farm buildings.

Copper is used for most wiring systems because it offers low resistance to the flow of electricity. However, it does offer some resistance and if we try to carry more amperes of electricty through a wire than it is designed for, the wire heats up and the insulation may be damaged.

Each size of wire is designed to carry a certain number of amperes of current without overheating. For instance, No. 14 wire can carry fifteen amperes and No. 12 can carry twenty amperes without danger of charring the insulation. This doesn't mean that No. 14 wire can carry fifteen amperes of current for several hundred feet without a serious loss in pressure, known as "voltage drop." It might do the job well enough for twenty-five or thirty feet, but if the distance were fifty feet we would need No. 12 wire to deliver the same pressure at the far end of the circuit. For one hundred feet we would need No. 8 wire.

A good, competent electrician knows how to figure the size of wire for each part of the farm wiring system and he will recommend wire sizes that will not only do the jobs you want to do now, but for years in the future.

The effect of drop in pressure in a pipe line is usually easy to see. The effects of voltage drop in an electric circuit may not always show up as easily. We may realize that some appliance doesn't seem to work as it should but we may blame the equipment instead of the wiring.

Let's see how different kinds of electrical equipment behave when the voltage or pressure delivered by the wiring is too low.

Have you ever noticed that lights may appear dimmer as more of them are turned on, or when some other appliance is started? The starting of a motor may cause the brightness of bulbs to dip a little. If they come back up when the motor is up to speed, this is not serious. But if the lights stay dim, it is a good indication that wires should be larger. For every one per cent drop in voltage, the light given off by an ordinary light bulb drops about three per cent. Thus a drop of two per cent in voltage causes the light given off by a bulb to drop seven per cent, but the electricity it consumes drops only three per cent. In other words, the amount of light given off drops a lot faster than the cost of burning the lamp. If we put in larger bulbs to overcome the loss of light, we are paying more for the light we get than if the wiring were improved. If the voltage or pressure delivered to some of the new fluorescent tubes is too low, they may not light at all, or may flicker. Proper size of wiring is particularly important with fluorescent lamps.

Heating equipment acts about the same as lighting. For every one per cent drop in voltage there is about a two per cent drop in the amount of heat produced, and it takes longer for a heater to give off the same amount of heat. For example, a drop of three per cent in voltage will cause a six per cent loss in heat and will increase by four per cent the time required to give off the same amount of heat.

In the case of an electric water heater, all the heat given off by the heating element goes into the water regardless of whether voltage is correct or low, but low voltage results in slower heating of the water. Similarly on an electric range it results in slower cooking. Low voltage is most serious, and proper size wiring is most important in the case of incubators and brooders for with these devices the life process of the fowl depends upon receiving the right amount of heat.

Motors are a different story. If

the voltage delivered to a motor is lower than it should be, the motor will take longer to start its load and if the voltage is too low, the motor may not be able to start at all. A five per cent drop in voltage cuts the motor's pulling power by about ten per cent. The effect on the motor is just as if we belted it to a machine too large for it to start, such as putting a five horsepower motor on a job that needs ten horsepower. The motor still tries to do the work. It keeps on trying, drawing more current in an effort to make up for the loss in pressure, until it stalls or burns out. In the case of a large motor, the cost of rewinding the motor might have helped to pay for better wiring.

About ten years ago the New York State College of Agriculture made up a travelling exhibit to demonstrate properly planned wiring and to show how appliances perform on good, adequate wiring and on poor, overloaded wiring. The Extension Service used this demonstration throughout the state and the men in charge gathered up quite a few stories and experiences from their audiences.

Low voltage is a problem that develops slowly. Many farms were wired twenty to twenty-five years ago, when few appliances were on the market and the principal use for electricity outside of the home was for lighting the farm buildings. Today the great majority of farms pump their water electrically, and many heat it electrically as well. Electric cooking is very popular. Probably at least seventy-five per cent of the cows are milked by electric milkers. Milk coolers are used almost universally. Thousands of milk house heaters and barn ventilating fans have been installed in the last three or four years, and hundreds of gutter cleaners. Mow hay driers have come into the northeast in the past six years and these, too, can be counted in the thousands. We just can't expect a 1926 model wiring system to do the job with a 1951 line of electrical farm equipment and do it efficiently and economically. A good, well-planned wiring installation is like a dairy barn ventilation system in one respect; we pay for it whether we have it or not. In the case of the ventilating system we pay in repair bills if we don't install fans to take the moisture out of the stable. And in the case of the wiring system, we pay for warming up wires between the farm buildings when these wires are too small. We pay for the electricity that passes through the meter. If some of it never gets to the appliances but is lost in overcoming resistance in small wires, we are paying for wasted energy. Money spent in this way might better be spent for a modern wiring system.

New "Safe" Cholera Vaccine

Condensed from the Farm Journal

Claude W. Gifford

PERHAPS the biggest news about hog cholera in 43 years came to a head recently. The first license for a "rabbit-produced" hog cholera vaccine was granted by USDA to the Fort Dodge Laboratories, Inc., of Fort Dodge, Iowa. The vaccine is already being shipped to veterinarians across the country.

This new vaccine is made from live hog cholera virus that is "weakened" by passing it through rabbits at different stages of its development. Its chief virtue is that it is still strong enough to develop immunity in the hog, but unlike the present "hot" hog cholera virus, it doesn't bring the infection onto your place, or produce an active case of cholera in your hogs.

The Fort Dodge vaccine is technically a "modified live virus." It will be called MLV. *It is used with a dose of regular hog cholera serum, the same as the present "simultaneous" serum-virus treatment.*

Lederle Laboratories of Pearl River, N. Y., is completing farm tests on another rabbit-produced product, which they will call Rovac Hog Cholera Vaccine.

Rovac is a "one-shot" treatment that isn't used with serum. "It gives rapid, lasting immunity," say Lederle scientists, who are now testing 10,000 hogs in four states to determine precisely how soon immunity will develop, and how long it will last. They hope to have their product on the market soon.

When your veterinarian uses MLV, along with serum, on your hogs, this is what you can expect, according to the Fort Dodge company and the Bureau of Animal Industry, which issued the license:

▲ *Your hogs are protected immediately against hog cholera.* The serum gives an immediate resistance that holds until the vaccine develops the immunity.

▲ *Vaccinated hogs won't give the disease to unvaccinated hogs.*

▲ *Your pigs aren't so likely to come down with the "secondary infections"* that are sometimes set off by the present "hot" hog cholera virus.

▲ *It gives a long-time immunity;* for how long, no one knows yet. Tests are now under-way to

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see if the immunity will last a lifetime, as Fort Dodge scientists think it might.

MLV is sold only to veterinarians. If you want to have your hogs vaccinated with MLV, you'll need to get in touch with your veterinarian so that he can place his order.

The Fort Dodge company expects to have enough of the vaccine to take care of all requests by next spring and summer.

The cost for vaccinating should be about the same as for the present double-treatment administered by a veterinarian. A dose of 2 cc. of MLV, and 15 cc. of serum is normally used for all ages and sizes of hogs—so the cost of the dosage will be about the same for all types. Veterinarians may decide it is better to use more than 15 cc. of serum in some cases.

The company recommends that MLV should be used 10 to 14 days after weaning, until tests show whether it can be used on suckling pigs. However, it can be used at all ages after weaning. Breeding stock held beyond normal marketing age should be revaccinated until the Fort Dodge tests show how long the immunity will last.

When you have fattening hogs vaccinated, you should take them off feed and bring them back gradually, as with the present virus-serum treatment. Newly vaccinated hogs show no reaction that you can see, but they sometimes run a fever for a short time. Only healthy hogs should be vaccinated.

MLV has been four years in the making, and has been used on hogs for two years. Altogether, 10,000 to 12,000 hogs of all ages on 40 to 50 Iowa farms have been treated experimentally.

Pigs from these herds have been brought into the Fort Dodge Laboratories, and each has been injected with a dose of live, disease-producing "hot" hog cholera virus —a dose several thousand times larger than enough to kill an unvaccinated hog. *Not one of the hogs treated with MLV has come down with hog cholera.*

For years we have had "dead virus" vaccines (such as crystal violet and tissue vaccines) that will not produce active cases of hog cholera. But you can't use serum with them to protect the hog until the natural immunity develops, which takes about 21 days.

These "dead virus" vaccines haven't caught on too well, because it takes so long for an immunity to develop, which then isn't permanent.

This new MLV is entirely different! it is a live virus with which you can use serum to protect the hog until the natural immunity develops from the vaccine itself.

As MLV can be used on all ages

of healthy hogs 10 days after weaning—whether previously treated or not—it should be an excellent product to use at sales barns. You could buy treated pigs without the danger that you would bring hog cholera home with you.

The license that has been granted to Fort Dodge is a "special" license, a classification frequently given to a new product. It means that for the first year, veterinarians who use MLV must report the results to the Bureau of Animal Industry as a precautionary step, and to help gather more information.

A new livestock product never completely proves itself until it has been used under all conditions in all parts of the country. It is possible that rabbit-produced hog cholera vaccines, of which MLV is one, may have drawbacks that will show up only after a great many farmers use it on their hogs.

Right now, the highly successful tests on the Iowa farms, and in the laboratories, suggest that MLV will not run into any serious drawbacks. However, the true worth of this vaccine, or others of this type that may be developed, will not be known for years.

At the present time, this new type of vaccination looks like the most important development in hog cholera since the USDA introduced the simultaneous serum-virus treatment in 1908. That type of immunization has had three effects:

(1) *It stopped the general hog cholera epidemics* of the old days, when so many hogs would die that there was a stench in the air from farmers burning their dead hogs; but . . .

(2) *It kept the live, "hot" hog cholera virus spread all over the country* wherever the double-treatment was used. And . . .

(3) *It has given us a fairly good treatment*—just good enough so that we have been content to live with the disease, whereas in Canada and England they have wiped it out completely.

This new "rabbit-produced" vaccine development could be the beginning of the end for hog cholera in this country, if the vaccines give life-long immunity. Areas might be vaccinated with these "safe" vaccines, and hog cholera eliminated area by area, and state by state, until we back it off the United States.

Already the state of Alabama has passed a new law—just last month—that outlaws the sale of "hot" hog cholera virus in that state. The U. S. Livestock Sanitary Association also has a committee studying new plans for eradicating the disease.

Self-feeding Silos

Condensed from the American Agriculturist

Earl D. Merrill

SELF-FEEDING silos are one of the many new ideas that livestock people are talking about for cutting costs and saving labor. Much has been done to save labor in field operations, but we are just beginning to figure out ways and equipment to save time on chores. Many a farmer who did not like the idea of climbing up and throwing down silage has been speculating on how this chore could be avoided. Trench silos, silo unloaders, and the new glass-lined silo with a bottom unloader are partial answers. A few farmers have used a conveyor and feed bunks in conjunction with a silo unloader.

Four years ago, a farmer in Indiana and another in the Hudson Valley put up silos with openings at the bottom and a cone in the center of the floor so that the cows could help themselves. They were largely modifications of the self-feeding cylindrical hay structures. But due to faults in the design, the silage did not feed down satisfactorily. This new self-feeding idea has been called a "cowfeteria."

Finally, in 1949, Paul Mazur of Fiddler's Creek Farm, Lambertville, New Jersey, working with Professor Charles H. Reed, Department of Agricultural Engineering at Rutgers University, divided a $12' \times 28'$ rectangular self-feeder into four $6' \times 14'$ compartments and filled them with grass silage which fed down satisfactorily in the small experimental bins. Professor Reed also worked with D. W. Ruedemann of Plainsboro, New Jersey, in developing the basic principles of a successful design in two $14' \times 40'$ cylindrical silos. This new idea worked successfully with corn silage on Mr. Ruedemann's farm. Mr. Ruedemann liked the idea so well that he now has four self-feeding silos with some modifications from the original design. Two of these silos are $14' \times 40'$ and two are $14' \times 50'$. He and Mr. Mazur used their silos in conjunction with self-feeding hay barns.

This experience led to the erection in 1950 of 14 other self-feeding silos—2 by the New Jersey Experiment Station, 4 on New Jersey farms, 3 in Maryland, 2 in Wisconsin and one each in Kentucky, Indiana, and Kansas. Several additional self-feeding silos are being erected this year—in-

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cluding two by state colleges of agriculture in Pennsylvania and Michigan. These silos were all modifications of the 1949 New Jersey designs.

They varied in diameter from 11′ to 16′ and in height from 25′ to 50′. They included wood, steel and concrete stave silos. A new silo at Fiddler's Creek Farm has a square base and an "A" shape divider instead of a cone. For unexplained reasons, this silo appears to function better than most of those with round bases.

Most of these silos were filled with grass silage in 1950. However, the grass silage did not feed down as satisfactorily as the corn silage. In fact, great difficulty was experienced in some cases. Dynamite and various devices were used to work the silage loose, and one silo in Wisconsin collapsed.

The engineers and some of the farmers working on these self-feeding silos, however, are confident that some further modifications in design and, possibly, changes in methods of filling and feeding will lick this difficulty with the grass silage. The idea is too good to give up. Yankee ingenuity and persistence should come up with the right answer.

The basic design is neither complicated nor expensive. While any farmer with the help of a welder and mason can put one up, the steel parts eventually will probably be produced by a manufacturer. A conventional silo without doors or chutes is erected on the self-feeding base. This base in almost all of these silos is made up of a ring of 8 to 12 "H" beam posts about 60″ high, securely anchored in the silo foundation wall and feeding curb. An angle iron ring is bolted or welded to the top of these posts. The silo is set on this ring. A sharp pointed concrete cone not more than 60″ high and with a smooth 45 to 60 degree slope is built in the center of the silo floor.

Several kinds of doors have been used to close the openings between the posts. Most of these silos were set up outside in the barnyard with a concrete feeding apron around the base and most have a flexible swinging gate of $2'' \times 2''$s or $2'' \times 4''$s hung from the top of the opening and spaced with chains so the cows can reach through to eat. These gates keep the silage from falling out if the silage comes down too fast, and they prevent the cows from getting caught in the silo.

How did the idea work out? While the experience was not exactly the same in all cases because of differences in silos and silage, it was the same for the most part on certain points. Even though doors for the base were not too well made, there was very little spoilage at the bottom on opening

or later in feeding; there was surprisingly little wastage; the cows getting into the silo with their front feet did not prove to be objectionable; freezing to the sides of the silo did not appear to present a problem even in Wisconsin, but when temperatures approached zero, the exposed silage at the bottom froze so the cows could not eat it. Rutgers University licked this problem by closing the openings with plywood sheets and using a small oil heater in the coldest weather.

When the silage came down O.K. the cattle ate more silage than normally had been fed. Because of the longer period of exposure, there was considerable spoilage on top. Several self-feeding silos will be equipped with the new synthetic rubber silo caps this season to reduce this spoilage.

Many farmers are asking about building a self-feeding silo. Those working on the problem are advising that if the silo is planned for grass silage, farmers may avoid mistakes by waiting another year until some further new ideas can be tested. It is recommended that anyone building a self-feeding silo should work with agricultural engineers at his state college of agriculture to avoid making mistakes in design.

Here are the arguments for a self-feeding silo: It saves all the labor of handling silage after filling; gives the cattle all the silage they can eat; increases the use of silos.

The self-feeding idea holds out the most promise for the beef farmer and for the dairyman with a pen stabling set-up. It is a natural complement to the self-feeding hay structure.

This is but one of the new tools being developed to cut costs in the new grass-animal agriculture.

When Ideas Are Exchanged

Condensed from the Ohio Farmer

Ray Miller

AN EXCHANGE of ideas on present day farming practices and methods, and the establishment of more friendly relations between American farmers and their European neighbors! That is the purpose of the Economic Cooperation Administration's program in assigning young European farmers to work on farms in the United States this year.

Twenty-two of these farmers—French, Danish, and Swedish—were placed on Ohio farms last spring with the help of county extension agents, the Grange, and the Farm Bureau. The plan seems to be working out very well.

Typical of these European farm boys are two Danish farmers assigned to farms in northwestern Ohio. Ole Nielsen, 25, from Holstebro, Denmark, a nephew of a former prime minister of Denmark, was placed on the Galen Newcomer farm in Williams County.

Ole comes from a 65-acre farm belonging to his father, Pedre Nielsen, in the county of Maabgerg. His hosts, Mr. and Mrs. Newcomer, furnish room and board and pay regular farm wages. The Danish young man finds farm operations on the 140-acre livestock and grain farm of Mr. Newcomer much more mechanized than they are on the average farm in Denmark.

And while the speed of power farming in these United States is an eye-opener for most of the European lads, Mr. Newcomer states that it is not just a one-way learning process. Most of these boys have some very good ideas of their own. Their American hosts will do well to take a leaf from the experience of the Danish farmers, who are known the world over as good farmers.

For instance, there was one day last spring when they started hauling manure to the fields on the Newcomer farm on a sunshiny and windy day. Ole shook his head and objected: "Not good." Meaning he thought much of the fertilizing value in the manure would be lost if allowed to leach out in the weather. Ole proposed that he would haul out the manure while Mr. Newcomer plowed it under.

Ole Nielsen was transferred to a farm in Iowa, July 18, where he will have an opportunity to observe things "where the tall corn

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Cleveland, Ohio, September 1, 1951

grows." Another farm boy, now in America on the exchange program will be transferred to the Newcomer farm to take his place for another three-month period.

Niels Nielsen, 28, another young farmer from Viborg, in Jutland, Denmark, was employed on a 2,500-acre farm in Sweden. He worked for a time in England before coming to the Guy Colwell farm in Defiance County, Ohio.

Niels, while he is well versed in livestock farming, is also keenly interested in power machinery. While in Denmark, he attended a tractor school where they tested tractors and made reports to farmers. He was awarded top honors in a class of 80 students in a farm machine school which he attended during the winter.

One piece of machinery Niels has never seen in operation—the corn picker used on American farms. He hopes to see one in use before his return to Denmark. While he has never had any previous experience with an automatic tie hay baler, he has been making a study of such a baler on the Colwell farm, and has been able to help a great deal in its operation and adjustment. Mr. Colwell admits that Niels is now better versed on the adjustments of the hay baler and makes a better trouble shooter than either he or his son, Robert.

Niels would like to have an automobile when he gets back to Denmark but a car which sells for $2000 here costs $8000 when it gets to the customer's door in Denmark, so Niels thinks he'll wait awhile before buying one.

Under the exchange program Niels next goes to a farm in Arkansas, and after six months there, he will attend agricultural school in Denmark.

Farm management is not a new thing for Niels Nielson. In his background of experiences he at one time managed a 200-acre farm, where they maintained a herd of 60 cows, 500 hogs, and a flock of chickens. And here in America he is probably making more rapid strides than some of his colleagues because of a fair command of the English language. Few things that occur on the farm escape his observation or understanding because he lacks the vocabulary.

These Danes, Swedes, and Frenchmen, from reports made by their host farmers, are almost without exception willing workers and eager to learn American methods of farming. They may not be able to apply all they have learned to farming practices when they reach home because of economic limitations in their native land. But, the experience is broadening and should make for better relations between our own country and those abroad.

Salt—for Dairy Cows

Condensed from Farm Research

S. E. Smith
Cornell University

SALT studies with farm animals are long overdue. Most of the factual information available on the salt needs of dairy animals dates back to a bulletin published by Babcock, of butter-fat test fame, in 1905. The material given in this bulletin is the basis of present recommendations on salt needs of milking cows—0.75 ounce of salt per cow per day for maintaining body weight, and in addition 0.3 ounce of salt for every 10 pounds of milk produced. To carry this recommendation into barn feeding conditions it is usually suggested that the concentrate mixture fed to cows should contain 1 per cent, or 20 pounds per ton, of salt, and in addition salt should be furnished free-choice in either loose or block form. This permits the cow to adjust her intake to her desires. Under this set-up, milking cows will consume some 1 to 4 ounces of salt per day, which is presumably adequate.

One argument involves the question of the value of loose salt as compared with block salt. Some say a cow will take much more loose salt; in fact some feel that she will often take too much for her own good. Others say that no cow can be expected to stand around all day licking at a hard block of salt (produced under 10,000 pounds of pressure per square inch to withstand weathering).

Two years ago, some of the cows in the Cornell herd were given the chance to express their preference for these two kinds of salt. Cows on three different kinds of pasture—permanent, alfalfa-ladino-brome, and ladino-orchard—were divided into two groups. One was given access to loose salt in a box and the other was given block salt. In addition to pasture, all cows were supplemented with a good concentrate mixture *containing 1 per cent salt.* During the summer months those cows given loose salt consumed an average of 1.1 ounces of salt per day, while those given block salt consumed an average of 1.0 ounce per day. Clearly, under these conditions, the cows showed no preference for either kind of salt.

The next summer the experi-

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Geneva, New York, July, 1951

ment was made more drastic. The salt was removed from the concentrate mixture and the cows had to depend entirely on *either* loose salt or block salt for their needs. This time the cows showed a marked preference for loose salt, and consumed an average of 2.8 ounces per head daily, as compared with only 1.5 ounces per day of the block salt. Of passing interest was the observation that where ladino clover appeared in the pasture mix, the cows consumed less salt. This should be studied further. The question that immediately arises is whether the larger intake of loose salt did the cows any good. Seemingly those cows fed block salt did just as well in terms of milk production and in maintaining body weight as did the cows that consumed more salt in loose form. Apparently then, 1.5 ounces of block salt took care of the cows' needs, and the salt consumed beyond this was just extra.

In other experiments, large amounts of dry salt were fed to dairy cattle under typical barn feeding conditions to see what effect a large amount of salt would have on health or production. The dry salt was mixed daily with the concentrate mixture. Various levels were fed, such as ¼, ½, and 1 pound daily. For a period of 8 weeks these cows consumed up to ½ pound of salt per day with no apparent harm, but they all refused the grain mixture containing 1 pound of salt per day. Apparently, under ordinary conditions the cow regulates her salt intake to keep it below levels where it might be harmful. The amount of salt that can kill a cow if given at one time is said to be from 3.5 to 6.5 pounds. Thus the over-enthusiastic dosing of cows with salt for bloat or indigestion is dangerous. It is good practice to hand-feed salt in limited amounts to cows that have been away from salt for a time, before they are given free access to salt, especially loose salt.

Another important question often asked by dairymen is "How long can cows go without salt before they decline in milk production?" In studies now in progress, as well as those of Babcock many years ago, it appears that no harm is done if cows are not fed salt for at least a period of several months. Shortly after cows are taken off salt, they show a marked craving for it, and lick and eat many abnormal objects such as wood, urine, manure, dirt, etc., in an attempt to get it. In spite of this craving, milk production, appetite and weight gains do not suffer for several months—at least 5 or more. But if they are deprived of salt for longer periods than this, milk production, body weight, and general health eventu-

ally suffer, and death can occur. When the present studies are completed, it will be possible to recommend more accurately the salt needs of cows for various levels of milk production, and to tell with more precision what harm is done to cows and heifers that are not fed enough of this most important mineral supplement.

Social Security for Farm People

Condensed from the Kansas Farmer

H. G. Love
Kansas State College

SEVERAL months have passed since the new Social Security law for farm laborers became effective. How is the new plan working?

Farm operators—either owners or renters do not come under the program. Neither do wages paid by an employer to his children under 21, or to his wife, or to his parents, count for Social Security. Other relatives in the household are covered if they meet the requirements that apply to other farm or household workers.

Only one farmer in eleven or about 10,000 to 12,000 Kansas farmers will be liable during 1951. Only those farmers who employ hired help on practically a year-around basis are affected by the new law. Some farmers and their hired men have been all for the new plan. They are glad to get the future benefits for farm workers that have long been available in towns and industry. Others regard the plan as "just another tax chore" and "more government meddling in private affairs."

The farm is the last bulwark of freedom and independence so each view has its own merits. The law is compulsory. Participation is not optional when the worker qualifies.

The new law divides the farm laborer's work year into 4 definite quarters. January thru March, April thru June, July thru September and October thru December.

A farm laborer must be classed as a "regular employee" for a full calendar quarter, *for one farmer,* before he can be covered by Social Security benefits or withholding of wages for Social Security pur-

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poses during the next quarter.

Altho the law became effective January 1, 1951, the first qualifying quarter for agricultural labor was October thru December 1950. Thus a regularly employed worker during that quarter and employed a full year during 1951 would have full coverage for all 4 quarters of 1951. The farm laborer must work a full calendar quarter to qualify. For example, the farm worker who started to work January 15, 1951, would use April, May and June for the first qualifying quarter. Withholding for Social Security tax purposes would begin on his July wages.

To obtain covered employment a farm worker must be considered a "Regular Employee" during the qualifying quarter. Thus, 2 or 3 days illness or work for a neighbor or vacation that did not *change* the *amount* of the worker's regular monthly check would be permitted during the qualifying quarter. The cash earnings for *each quarter* must be at least $50. Payments in kind such as wheat, corn, milo, beef, pork, milk or other farm produce are not counted as wages for Social Security purposes. Some farmers are using this feature to avoid coverage. For a short time this might be a satisfactory procedure, but in most cases this will prove cumbersome and unsatisfactory. Such farmers will likely revert to payment of wages in the usual manner. Their regular employees will then be covered after the first qualifying quarter.

The employer is responsible. The farmer or employer has to send in all the Social Security taxes on the wages of his eligible workers. The rate until 1954 is 3 per cent of the cash wages paid on eligible covered employment.

Not all the money for the tax comes from the employer's pocket. Half the tax, or 1½ per cent of cash wages, is deducted from the wages of the worker. Then the employer adds his share, which is another 1½ per cent, and remits the total 3 per cent in a single report.

Thus, altho the hired hand pays part of the Social Security, the contribution deducted from his wages is remitted by the employer, not by the worker.

The farmer or rancher makes remittance to the Collector of Internal Revenue of the district in which his principal place of farm or ranch business is conducted, the same as for regular income taxes.

The farmer makes his report on Form 941, which is supplied by the Collector of Internal Revenue.

Reports are accompanied by the employer's check for the Social Security taxes to be paid. Due dates are one month after the end of each calendar quarter.

First quarter ends March 31—Report due April 30.

Second quarter ends June 30—Report due July 31.

Third quarter ends September 30—Report due October 31.

Fourth quarter ends December 31—Report due January 31.

The tax is based on only the first $3,600 of wages paid in a year. Wages paid above that are not taxed for old age and survivors insurance.

The law does not require the farmer or other employer to keep any particular kind of record. But it will be easier to fill out Internal Revenue Form 941 if the employer does record facts.

There are over 170 diseases transmitted from animals and fowls to man.

The so-called wild animals, as a group, are responsible for the transmission of more diseases than any particular specie.

Dogs and cattle are capable of transmitting 25 diseases each, the rat 18, sheep 16, cats 14, swine and poultry 12 each, goats 11, the horse 10, and rabbits 4.

Tuberculosis is transmitted to man by at least 7 different species of animals, brucellosis by 8, rabies by 6, including wild animals, and anthrax 6.

Most of these diseases are caused by bacteria or viruses although some are parasitic in nature with the animal acting as intermediate host.

Tuberculosis and brucellosis are the two most important infections so transmitted, with rabies ranking third.

Some of the less important diseases transmitted from animals to man include anthrax, glanders, cowpox, erysipelas, milk sickness, tularemia, septic throat, trichinosis, Rocky Mountain spotted fever, and food infections.

Medical men and public health authorities have long known that milk from tuberculous cattle as caused much human infection and loss of life, especially in infants.

Thirty years ago it was estimated that eleven per cent of all infant tuberculosis was of bovine origin.

A campaign to eradicate tuberculosis in cattle is underway, with cattle being tested on farms and infected animals sold and slaughtered as reactors.

Your Health
—Medical Society, State of Penna.

How to Raise Better Calves

Condensed from the Pennsylvania Farmer

C. B. Knodt
Pennsylvania State College

For the past 20 years the Department of Dairy Husbandry of the Pennsylvania State College has been working on methods of raising calves. Since 20 to 25 per cent of our dairy calves which are being raised for replacements die before they are one year of age, the importance of this problem can be appreciated. The future of any herd depends in a large part on the program followed in raising calves.

As a result of research, the costs as well as many of the hazards of raising dairy calves have been reduced greatly. As an example, numerous reports have been coming in relative to the excellent results that many farmers are getting with the milk replacement formula developed at the College.

Many of the problems in raising calves were found to be the result of deficiencies of vitamins A and D. Many calves are deficient in vitamin A at birth and even with the large amount of vitamin A supplied in the colostrum they may still be deficient in this vitamin. This is particularly true during the winter months when cows are on poor roughage. The deficiency may result in many deaths of calves during the first few weeks after birth.

As a result of this and other problems, milk replacement formulas have been developed which provide all the vitamins, minerals, proteins and other food substances known to be needed by the growing calf. Under research conditions, as well as under dairy farm conditions, calves are being raised which are equal to and in many cases superior to those raised previously on milk. Thousands of calves are being raised on these formulas and the numbers are growing rapidly.

Not only are we raising better calves than ever before but they are being raised at lower costs. Recent developments make possible considerable savings in feed costs. Many industrial products are now being put into calf feeds which are of considerable benefit to calves because of their vitamin and protein content. Dried skim milk was at one time considered necessary at a level of at least 400 pounds per ton, but recent work

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has shown that by proper feeding much of this can be replaced by cheaper products. It is now possible to make substitutions for skim milk in calf starters and raise equally good calves with other products.

Many good quality calf starters are available on the market today. These rations are formulated on the basis of the needs of the dairy calf. Some of the ingredients are somewhat difficult to purchase in small quantities and so it may be easier and cheaper to buy a starter from a reputable manufacturer. In addition, calf starters should be bought only in small quantities. It is not desirable to buy large quantities and store them for long periods of time, as the vitamin A content may decrease greatly if the mixture is kept over two or three months.

A hungry calf is a healthy calf. Many good calves are ruined by over-feeding. Calves should begin to eat starter at ten days of age. Rub a little of it on their noses after each milk or replacement feeding until they start to eat it by themselves. Calves should not be permitted to eat in excess of five pounds of starter per day, as they will not eat adequate amounts of hay. It is not necessary that the starter be pelleted. Calves will not, according to our experiments, begin to eat pellets any earlier or make any faster gains on pellets than they will on a good quality mash-type starter. Do not feed calves more starter than they will clean up in two days, as they will refuse to eat it and it will take longer to get them started on it.

The importance of a good quality extra leafy hay in feeding calves cannot be overestimated. They will begin to eat hay at a much earlier age and make faster gains if they are supplied with fresh hay daily. It is difficult to raise good calves unless they are provided with all the high quality hay they will eat at all times. We prefer an early cut grass legume hay to one with legume only. They seem to eat it at an earlier age and eat more of it.

Probably the most important problem in raising dairy calves is scours, much of this trouble being the result of poor feeding and management. Scours cases can be very serious and may lead to the death of the calf. Where scours cases occur, depend on the help of a veterinarian. By the use of sulfathalidine and other drugs as indicated, his services can be of considerable value. Early treatment is of great importance and is essential in keeping injury to the calf at a minimum.

Many dairymen have found that some of their cases of scours can be prevented by taking the calf from the cow as soon as it is born. Apparently many calves

tend to nurse too much milk and scours results. We have found that controlling the intake of colostrum to four pounds twice per day for the larger breeds and three pounds twice per day for the smaller breeds for the first four days may reduce the scours problems. Feeding this amount from clean pails has many other advantages. It reduces the injury to the teat and udder caused by the calf during nursing. A calf bunting a hard udder may produce serious injury which may result in mastitis.

It is much easier to teach the newly born calf to drink than one which is several days old. It also reduces the amount of excitement as far as the cow is concerned. Some cows become serious problems when their calves are taken away at three to four days of age. They may fail to let their milk down and serious decreases in milk production may occur. Taking calves away soon after birth has many advantages. By all means the end of the navel cord should be treated with tincture of iodine as soon as possible after birth. If this practice is not followed, serious cases of infection may follow. The future of a herd depends on the calves being raised now.

Want More Pigs?

Condensed from the Hog Breeder

INHERITANCE is a key factor in influencing litter number, pig size, disposition. Strong, fast-growing gilts and young boars from big litters produce healthy, quick-gaining pigs of their own. Good natured sows aren't so apt to crush pigs—and they pass on their good disposition.

To pick breeding stock, check first the litter size and gain records of pigs ear-notched at farrowing time. Select gilts, and boars coming from litters of eight or more with high weaning weights. Young pigs with good weaning weights keep on growing. Pick gilts with 10, and preferably 12, well-spaced teats, none of which are inverted. General conformation should include long and deep-body for high feeding capacity. A good spring of ribs, well developed hams and a trim head are other guides. Make sure females have straight, strong-boned legs with short pasterns.

The boar "is more than half the herd" so use only purebreds of

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known ancestry. Pick a boar that is rugged, masculine, good boned, sound on his feet, with a rudimentary development of 10 or 12 teats.

Feeding and management influence over-all herd fertility. Gilts not handled properly during growth go into the breeding season under-developed. They mature later sexually; the number of eggs they produce and the nutritive condition for developing embryos may be below normal.

After gilts reach 150 pounds, pull them out of the growing-fattening lot and put them on a ration of more oats, less corn. Turn them into the best pasture you have and supplement it with at least 12 percent crude protein. If no pasture is available, feed either ground alfalfa (15 percent of the ration) or good quality alfalfa hay in racks. Step up the protein to 15 percent.

Keep gilts on pasture at least until they are bred. Or have an alfalfa pasture right through the winter.

To "tune up" your gilts, "flush" them just before the breeding season. A week or two before breeding, start feeding more liberally, especially protein, while on pasture so they are gaining in weight at breeding time. Research workers haven't definitely proved flushing causes sows to ovulate more eggs, but it does help bring gilts into heat and make breeding more sure.

Flushing should be continued until all females are safely settled, or until a short time after the breeding season ends.

There are three main things to consider as to time of breeding—the age of gilts, next year's markets and your farrowing facilities.

Experimenters have found that where gilts were bred before eight months of age their first, second and third litters were smaller than those of gilts bred at eight months or older. R. F. Wilson, South Dakota State College swineman, reports gilts ovulate more eggs during the second and third heat periods, so don't breed during the first period, if it can be avoided. If you hand breed (take the females to the penned boar), breed each animal one day and again the next. Missouri experiments show two services during the same heat period (12 to 24 hours apart) got more gilts to settle and increased litter size by 2.3 pigs per gilt.

Where only one service is given during each heat period, Wilson estimates 75 to 80 pregnancies per 100 services is the best you can expect.

Pasture breeding will give the same results as two hand or pen services, Wilson says, if you have enough boars. He figures one early spring boar can get 15 to 20 gilts

settled in three or four weeks. For sows, especially large ones, pasture breeding may not be as good as the pen or hand method.

If you use the pen or hand method, try to arrange your pens so that the boar can be taken to the sows. It's a little easier to move a boar than to move a gilt when she is in heat.

Along with all that, try to time breeding for the best possible fall market. In 1949, a 220-pound hog was worth $17.50 more in August than in December. Every year, he'll again be worth more in the early fall months than later.

The end of the breeding season isn't the time to suddenly cut down on feed. Sows and gilts need a good ration and special care to keep embryos developing and to build themselves up for the nursing period ahead.

Profits depend on the number of pigs born alive, so see that females get a ration containing 15 percent protein, liberal supplies of minerals and vitamins. One complete ration recommended by H. G. Zavoral, Minnesota extension animal husbandman, includes 50 parts corn, 25 parts oats, 10 alfalfa, 7½ tankage, 7½ soybean meal and 1½ complex minerals, all ground together. Hand feed an amount equal to 2½–3 percent of the sow's weight per day.

Another ration for the fall might be this: corn on the cob morning and evening (2½ to 3 percent of sow's weight), plus 25 parts good ground alfalfa, 30 of tankage, 40 soybean oil meal and 5 minerals, self fed. Feed the alfalfa hay in racks if you don't want to grind it.

Sows and gilts should be kept gaining during the gestation period, yet shouldn't be unduly fat at farrowing—fat ones may have trouble farrowing and be clumsy in the pen. But don't reduce them. That is more dangerous than too much weight. Give them exercise by feeding some distance from their houses. Eliminate slippery floors, high sills that scrape udders. Sand icy lots.

Provide warm, dry quarters with enough bedding so sows won't pile up some cold night and possibly injure each other. Floor space is important. Gilts and sows need plenty of sleeping space. Lack of adequate quarters can cause back, pelvic or leg injuries, particularly late in the pregnancy period. That may mean abortions or dead pigs at farrowing time.

Ten days before pigs are due, clean and disinfect pens with hot lye water (one pound of lye to 30 gallons boiling water). Build in guard rail and heat lamp units, making sure bulbs, and electric cords are out of reach of sows. Wash the sows, especially their sides, udders and teat ends with warm, soapy water, but be careful

about washing them all over on cold days. Put them into pens and turn on heat lamps a few days before pigs are due so they can become familiar with their surroundings. Reduce rations by 20 to 40 percent and feed a handful of oil meal for a laxative.

Have only a small amount of bedding in the pens at farrowing time. Too much bedding may cause smothering of pigs.

Ample space is important in farrowing pens. Wilson recommends at least 6×6 feet for sows weighing under 350 pounds. Heavier ones need 8×10 feet. Guard rails should be of 2×4's or 2×6's placed eight to ten inches above the floor and an equal distance away from the wall. Artificial heat is important too.

Careful hog men like to be on hand "that coldest night of the winter" in case it's necessary to take pigs away from a restless sow. A box or half barrel with a burlap sack for cover will keep pigs comfortable until they are returned to the sow.

After farrowing, sows should be given water but no feed for the first day. Then, if you hand feed, start them on a light feed at first, building them up to full feed in a week to 10 days. If you self feed, you may want to leave the feeders in front of them from the first.

Alfalfa in the ration should be reduced by 10 percent and corn increased by that amount. But do it gradually or sows may have too much milk and the pigs scour.

Remember the statement "inheritance is a key factor in influencing litter numbers, pig size, disposition". Inheritance *records* start at farrowing time. From these pigs will come next year's breeding stock—and ear marking pigs at birth is the way to eliminate guesswork.

Any notching system is satisfactory, just so you understand it. One suggested by the University of Minnesota is to give a value of one to a notch anywhere in the outer (lower) margin of the right ear. A notch in the outer margin of the left ear always has a value of three. One in the inner (upper) margin of the right ear always has a value of ten, and one in the inner margin of the left ear thirty.

You can notch all litters, or only pigs in the best litters. If you buy your boars, you need notch only the gilts.

As for the records, you'll want to note the size of litter, health, weight and uniformity of pigs at birth, any abnormalities which may be inherited, and how many die. General disposition of the mother should be recorded, along with her milking capacity, which is indicated by gains of pigs. As the pigs grow, watch economy of gain and record their weights at weaning time, and at 150 days.

Origin of Brahman Cattle

Condensed from The Cattleman

Charles Wilford Johnson

A MAJOR portion of the world's cattle are of Brahman[a] bloodlines. Yet only with their phenomenal increase in numbers within the past two decades together with the expansion in grassland farming in the Gulf Coast states have these cattle received more than passing attention in this country.

Actually, many persons have rather strong prejudices against the use of these animals here, but on examination of these prejudices it becomes apparent that they are frequently based on little more than a different general appearance, and their rodeo acquired reputation. Moreover, relatively few persons realize the great number of differences between these animals and the Bos taurus breeds prevalent in the United States today.

These differences are quite important in hybridization, for the maximum of hybrid vigor is apparently obtained when either unrelated species or widely divergent types of the species are successfully crossed. Thus, the numerous differences between Bos indicus and Bos taurus and the antiquity of their divergence assume considerable importance. No consistently successful animal cross gives greater hardiness with the possible exception of the mule.

Major Differences Between Bos Indicus and Bos Taurus.

Hump—Generally composed of meat marbled to varying degrees with fat; bulls possess larger humps than either cows or steers and the size varies with breeds.

Vertebrae—Number of vertebrae.

	Cerv.	Dors.	Lum.	Sac.	Caud.	Total
Zebu	7	13	6	4	18	48
Common Ox (British) ...	7	13	6	5	21	52

Gestation Period — Commonly around a month longer.

Horns — Generally upturned and tend toward lyrate form with bases close together. Mysore breeds in particular have "antelope-like" horns.

Skulls—Frequently shorter than European breeds; commonly tend

[a] A name apparently originated in Texas for all Bos indicus blooded cattle, and later adopted by the U. S. D. A. Zebu apparently was first used by a French naturalist and accepted in Europe for designation similar to the name Brahman in this country.

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Fort Worth, Texas, July, 1951

to have convex foreheads; some difference in eye positions as compared with British breeds.

Skin and Hair — Quite loose, dark and tough skin; fine, short, and glossy hair which lies close to body; frequent presence of nilgai-like markings on the feet of some breeds.

Sweat Glands — Full functioning sweat glands.

Panniculus Muscles—Well developed and fully functioning over entire body.

Udder — Forequarters usually yield most milk.

Temperament — Highly sensitive disposition; spirited and energetic (especially contrasts with British breeds under tropical and subtropical conditions); shy and reluctant to breed in presence of man; strong maternal instincts; more gregarious than British breeds; commonly refuse to be driven forcibly, but with proper management can be readily led; cows often not so gentle as bulls.

Extreme Hardiness—

1. Characteristics associated with heat tolerance:

Abundance of loose skin which contributes to the associated loose, pendulous underlines and provides a much larger surface for heat loss.

Full functioning sweat glands compared to the rudimentary and practically non-functioning ones of Bos taurus.

Fine, short, glossy hair lying close to body is quite insignificant in retarding heat loss, and glossy light colors reflect considerable sunlight.

Dark skin impedes penetration of solar rays which cause skin burns.

Bodily functions change but little with increase in air temperature, i.e., in contrast to Bos taurus they have:

Little increase in body temperatures.

Little increase in rate of respiration.

Little increase in heart rate.

No abnormal hemoglobin indexes or abnormal physico-chemical balances attributable to this cause.

From 1½ to 2 times as much water vaporized through their skins.

Little change in rate of growth or milk production.

Little distress or exhaustion or loss of reproductive functions.

Grazing little retarded by heat or direct sunlight. Comparative expenditures of daytime hours under similar conditions at Jeanerette U. S. D. A. Experimental Farm:

	Brahman	Aberdeen-Angus
Time in direct sunlight	100%	52%
Time grazing	43%	28%

2. Characteristics associated with self-reliance and self-sufficiency:

The hump is at least partially a survival factor which provides both energy and water for periods of drouth and famine.

Longer legs so that the Brahmans can truly walk with long easy strides rather than waddle, which enables the animals to cover a larger range area and go farther for feed and water.

Ability to utilize coarse feed—live on forage other cattle refuse and thrive on roughages which cause other cattle to lose weight.

Their sensitiveness, intelligence and shyness seem to make them somewhat less dependent on man and more energetic and resourceful.

3. Characteristics associated with resistance to disease and insects.

A combination of factors discourage insects:

Tough skin difficult for insects to penetrate.

Sweat and sebum secretions.

Panniculus muscles operative over entire body.

Fine, short hair restricts insect lodgment.

Particularly flexible tail (no vertebrae in the end).

Long ears which can be readily moved to brush away insects.

Disease resistance:

Characteristics above which discourage disease producing insects.

Resistance genetic in origin and/or better adaptation to environment.

Not so seriously affected by tick fever, anaplasmosis, rinderpest, foot-and-mouth disease, anthrax, and tuberculosis.

Origin

In contrast to the disputes as to the area of origin of many plants and animals, there is a rather surprising amount of agreement as to the origin of Bos indicus having been in the India-Burma-Malaya area. Others, and particularly those more familar with the Bos primigenius lineage of Bos, tend to prefer the Middle East or possibly adjacent Africa. A few suggest dual centers of origin, but this seems rather unlikely. Thus far, the greatest number of early fossil finds lend considerable credence to India-Burma-Malay center of origin theory. Moreover, the presence of an estimated one-third or more of all the world's cattle (largely Brahman blooded) in this area has apparently influenced some writers to the belief that this is the center of origin, and perhaps this is worthy of some consideration. Much more significant, however, is the evidence provided by

the great diversity of breeds of Bos indicus in India. Phillips lists 32 distinct breeds. Dasgupta has about the same number, while Cobb mentions there being over 50 different types and strains of these cattle in India. Such diversity suggests extremely long residence, if not origin, in this area.

As to whether modern Bos indicus or Bos taurus has a greater degree of domestication is quite debatable, but in *at least* three items there is a marked difference between the two.

Social characteristics: Bos indicus much more gregarious than British breeds, (which can be considered as representative of Bos taurus).

Reproduction: Bos indicus bulls are extremely reluctant to serve in the presence of man and strongly resent hand aid.

Success in going wild: Feral animals have been found in Formosa and reportedly there are successful instances in India.

These three differences would seem to indicate that Bos indicus has come less completely under the dominance and subjugation of man.

Although the methods of early domestication of cattle are unknown, it is strongly to be suspected that the first domestication was largely associated with young animals. Perhaps the gregarious nature of these animals was taken advantage of by corralling the herds in primitive stockades or steepsided valleys, with fences, and the young segregated and in turn used for breeding stock which would become quite familiar with man. Over several generations, the social structure of "cow society" might have been so altered as to make possible the substitution of man as master replacing the authority of the former natural herdman—the dominant male. Perhaps the success of such a system was enhanced by a selection of cows which were originally low in the "social register" of the original domineering cow social system, and in a newly constituted herd it would be possible for some of them to climb in social prestige, though under the new master—man. These herd ties are apparently quite strong today in both confined and feral herds. Family ties, however, seem largely to have been limited to the strong tie between mother and calf. (This tie is particularly strong with Brahman cattle today.)

Once coralled, the technique may not have only involved selection of young, but quite probably also included elimination of many of the most vicious animals (particularly males) and a starvation technique of subjugation.

In the large island of Formosa, for example, there are feral herds (of Zebu), no doubt originally im-

ported from China, on which corralling is practiced to this day: 'A wooden stockade is erected with four sides in one of which is left a door. The cattle are driven towards it until they all enter, when the gate is shut on them and they are barred in and left to starve. They are afterwards by degrees haltered and bridled, and treated to fodder and beans until they have become not different to domestic cattle' (Swinhoe).

Whatever the means of domestication, it seems reasonable to believe that the animals must have been secured in numbers sufficient for the establishment and perpetuation of the herd, and that the confinement area was sufficiently limited as to necessitate the supplying of considerable feed and forage.

The possible reasons for domestication of Bos indicus fall largely into two broad groups—first those associated with mysticism and religious ceremonials, and those associated with directly utilitarian usages. Though quite difficult to prove conclusively, it seems highly probable that the first of these was the major reason for earliest domestication. Primitive man was not rationalistic as judged by modern standards, but rather was emotional, imaginative, and impulsive. So that it seems vain to seek for rational motives for earliest domestication of cattle. Primitive man frequently endowed the wild creatures with a spirit similar to his own and often adopted them into his religious worship, placing his tribe under their protection. Mysticism and religion seem to be in most consistent use with the early possessors of cattle. "Cattle came to symbolize divine guidance, invincibility in war, and finally fertility and immortality." Possibly even divination was involved as several ancient tribes inhabiting Korea and Manchuria formerly had a system of divination from the hoofs of cattle and horses and the bones of oxen. At any rate, earliest domestication seems closely tied to mysticism and religion, with sacrificial animals also supplying meat for ceremonial feasts. Hides and bones may have also been interlinked with ceremonials as well as possibly supplying utilitarian needs.

"That the bull and the cow have often been regarded as embodiments and even gods of fertility is well known. . . . It was perhaps the wish to enlist the magical fertilizing force believed to inhere in the ox-kind rather than to secure the aid of their physical strength which led to their association with the operations of early agriculture. . . . The intimate connection of the ox-drawn plow with religious ideology suggests the query whether it was not itself actually

of priestly origin, and first employed in the production of sacred crops, destined for ceremonial uses. . . . Mesopotamian cylinder seals display the plowman garbed as a priest; or they show the plow in association with astral symbols or being offered to a seated god or goddess of agriculture."

Thus, mysticism and religion surely must have played the dominant role in earliest domestication with the earliest use for plowing being primarily related to ceremonial purposes. These uses were in turn followed over a long period of time by the many utilitarian uses of Brahman blooded cattle including such unique ones as cavalry animals and shepherds, and sentry duty.

Reed Canary Grass

Condensed from the Michigan Farmer

Karl Vary, John Davis and C. M. Harrison
Michigan State College

A RECENT development in grassland farming which is attracting widespread attention among farmers, has been the establishment of reed canary grass on wet, mucky areas. Approximately 5 million acres, or one out of every 8 acres in Michigan is muck. The term "muck" in this report, refers to all types of organic soils. At present only a very small acreage of this muck land is under cultivation.

Generally speaking, these areas produce little, if anything, but unpalatable marsh grass pastures which were reported by farmers as being practically worthless. A frequent comment made by farmers about these pastures was that they were good for nothing except possibly the growing of hide, hair, hoofs and horns on livestock. Though muck areas on many Michigan farms are small in size, they comprise some of our most productive soils. When broken up and established to reed canary grass, they can be made highly productive. This grass thrives on soils too wet for other farm crops.

Reed canary grass is a hardy growing plant which spreads by underground root systems as well as reproducing itself by seed. It produces a heavy, thick turf when

Reprinted by permission from the Michigan Farmer
Detroit, Michigan, July, 15, 1950

established which stands up exceedingly well under pasturing.

In this study, an attempt was made to provide information regarding (1) the method of establishing, (2) management, and (3) cost of establishing reed canary on muck areas. It was thought that this information would prove helpful in determining the economic feasibility of developing other areas such as these for reed canary grass. Fifty-five farmers in south central Michigan were visited to obtain their experiences in establishing and managing reed canary grass. They had their experience on 84 fields totaling 811 acres during late 1948 and in 1949. In addition, cost account records were kept with a number of similar cooperators who were establishing areas to reed canary grass. Although reed canary grass is often thought of as being a relatively new forage crop, a few farmers reported stands 18 to 20 years old.

The size of areas most commonly reported upon which reed canary had been established was between 5 and 8 acres. Only one farmer reported a field of over 40 acres. Better than three-fourths said their fields were less than 12 acres. All fields studied had wet, mucky soils which occurred along rivers or in depressed lowland areas. Flooding with water for 10 to 60 days during the spring each year was a common occurrence on 88 per cent of the fields. Seven per cent of the fields were reported as flooding an average of 11 days each fall. Where drainage was available to fields, 50 per cent were drained by open ditches and 20 per cent by tile. Thirty per cent of the fields had no drainage.

Breaking up and preparing a seedbed for most of these areas depended upon finding a dry period of the year when the soil could be worked. The most satisfactory stands of reed canary grass were obtained where it was possible to prepare a firm seedbed free from weeds.

Eighty-four per cent of the areas was plowed at the time of breaking. For this job, regular muck breaking plows were used on 61 per cent of the areas and upland plows on 24 per cent of the areas. In most instances, crawler type tractors were used to pull the muck plows, and wheel type tractors to pull the upland plows. In only 3 cases were horses used in plowing. After plowing, the most common practice in preparing the seedbed was disking or harrowing. In general, the disk was reported as being far superior to the harrow for this purpose.

For the most part on the remaining 16 per cent of the areas an attempt was made to get a stand of reed canary grass without first fitting a seedbed. These at-

tempts were reported as largely unsuccessful although one case was reported in which an excellent pasture was obtained by seeding among stumps left after brush had been removed.

Time of seeding depended pretty much upon when the seedbed was prepared. Forty-nine per cent of the areas were reported as being seeded during August and September with the largest number in August. Twenty-six per cent were seeded in March and April. In general, spring seedings were made by broadcasting the seed, and depended on thawing and freezing of the ground to cover the seed; fall seedings were made by using a grain drill. In a few instances, late seedings were made successfully in November after the growing weather had passed. Seeding at this time delayed seed germination and growth until early spring.

Of the different kinds of equipment used in seeding reed canary grass on these areas, the grain drill was used on 36 per cent, the cyclone seeder on 36 per cent, the horn on 15 per cent, the fiddle on 7 per cent, broadcast by hand 4 per cent and the wheelbarrow seeder on one per cent of the fields.

Seventy-six per cent of the fields were reported as having been seeded to reed canary grass at the rate of 5 to 8 pounds of seed per acre. Six pounds to the acre was most common. In order to sow the recommended 5 pounds of reed canary grass seed per acre, it was found that a grain drill should be adjusted to the same setting necessary to deliver 12 pounds of alfalfa or sweet clover per acre. In seeding, excellent stands were reported obtained when the seed distributing tubes on the drill were adjusted to drop the seed just behind the drill's disks. The cultipacker was then used immediately after the seeding operation. In this manner the seed was planted shallow and almost all of it seemed to germinate.

Seventy-one per cent of the fields sown to reed canary grass were seeded alone. Nineteen per cent were sown to a mixture of reed canary, timothy and clover; 9 per cent were sown with an accompanying nurse crop of small grain, usually oats. In several instances, Ladino clover-reed canary grass mixtures had been seeded. Usually it was reported that the Ladino was greatly reduced the first winter by freezing and heaving. At the end of the third year, weather conditions and increased reed canary grass growth had caused the Ladino to disappear almost completely.

At the time of seeding reed canary grass no fertilizer was applied on 56 per cent of the acres. The amount of fertilizer most

commonly used on the areas where it was applied averaged 270 pounds per acre. Most farmers, when asked as to the analysis of fertilizer applied, remarked that they would have liked to use a fertilizer high in potash, such as an 0-9-27 fertilizer, but instead had used the fertilizer analysis they had on hand for upland fertilization, frequently a 2-12-6 fertilizer. Only 3 farmers applied lime or used micro-nutrient elements in fertilizing.

Slightly better than two-thirds of the fertilizer was applied by using a grain drill. The next most common method was spreading the fertilizer by hand.

Sixty per cent of the areas were pastured the first season after being seeded to reed canary grass. This practice was most commonly reported for the areas upon which a good seedbed had been prepared. Reasons given for not pasturing the first season were: 32 per cent, not enough growth; 4 per cent, cut for hay or bedding; 2 per cent, not enough livestock; one per cent, not fenced; and one per cent, too wet.

Ninety-five per cent of the farmers who pastured reed canary grass reported that it should be kept below 12 inches in height in order to get the most from the pasture. Over three-fourths of the fields were pastured when they reached a height of 12 inches which was usually during May. Sixty-eight per cent of the farmers reported that they attempted to keep the pasture at this height by keeping enough livestock on it while 32 per cent mowed or clipped their pasture.

Information reported by farmers for 60 fields of reed canary grass pastured which totaled more than 640 acres showed that on the average 3 animal units per acre were pastured for 4.8 months. Fifty-two per cent of the fields were pastured for better than 5 months. An animal unit was considered as the equivalent of one mature cow. Once established, reed canary grass provided pasture for the entire season.

Dairy cattle pastured on 65 per cent of the reed canary grass fields, received the same amount of grain feed as when on upland pastures. Beef cattle, pastured on the remaining 35 per cent of the fields, received no grain feed. Livestock was reported as liking and finding the reed canary palatable for 90 per cent of the fields. On only 11 per cent of the fields were the livestock confined to the reed canary pasture alone. However, most farmers reported they thought it would be better to confine livestock to the reed canary pasture alone and not give them the choice of other pastures.

Of the fields upon which reed canary had been established, only

25 per cent had ever been refertilized. In general, it was not thought necessary to refertilize fields established on river or creek flats which were subject to overflow from the streams. Fields of reed canary which were refertilized received on an average 300 pounds per acre of one of the following fertilizer analyses: 0-9-27, 0-20-20 or an equivalent analysis. Equipment used in refertilizing the different fields were: lime spreaders, 39 per cent; drill, 28 per cent; endgate, 28 per cent; by hand, 5 per cent.

Only 7 per cent of the fields were harvested for seed. Farmers reported difficulty in harvesting reed canary seed, for the time in which it could be harvested was very short. A considerable amount shattered soon after it reached maturity. In ripening, the reed canary head does not mature uniformly as the first seeds ripen at the top of the head and fall out as they ripen. Varying with the season, heads were reported as beginning to appear the first part of June and seed was ready to harvest the last of June and the first part of July. The amount of seed reported harvested ranged from 40 to 300 pounds per acre. The equipment most commonly used to obtain the seed were light combines with raised tables. Usually no special screens in the combine were found necessary, but cylinder speeds were reduced and wind intakes were cut to a minimum. After harvesting, the seed required drying and precautions had to be taken to keep it from overheating and spoiling. Most farmers generally spread the seed out thinly over barn floors and shoveled it over as needed to keep it from spoiling.

Thirty-five per cent of the fields had, at one time or another, been cut for hay. Farmers reported the best hay was harvested, from the standpoint of how their livestock responded, when the first heads began to appear. In feeding reed canary hay to livestock, farmers were of the opinion it was about equal in feeding value to timothy hay. When harvested as grass silage, it made a good grass silage with a protein content ranging from 17 per cent (cut early) to 10 per cent when the grass was headed out.

The palatability of reed canary grass was reported as satisfactory for dairy, sheep, beef and horses when it was kept below 12 inches in height and not allowed to grow rank and coarse. In general, farmers thought it was probably best to confine livestock to the reed canary grass pasture alone as the animals usually preferred other pasture if given a choice.

The cost of breaking up muck areas and establishing them into reed canary grass varied consider-

ably. The most common practice being followed by many farmers was to custom hire a muck area plowed and disked over once or twice. The farmer then usually finished preparing the seedbed himself by disking from 4 to 6 times. Fertilizer, if any, was applied by broadcasting it before the last disking, or through the grain drill at the time of seeding.

When custom hired, plowing and disking charges were on a per hour basis and their total cost usually depended upon the ease or difficulty encountered in plowing under the type of cover or vegetation found. Straight marsh grass plowing went much faster than when bothered by logs, roots or getting stuck. Often the hiring of a man who was experienced in plowing wet muck areas means the difference between a costly, poor job of plowing and a less costly, good job.

The average cost of establishing fields of reed canary grass was $35.70 per acre. (Table 1) Costs per acre ranged from a high of $55 to a low of $20 per acre.

The estimated average annual cost of a reed canary grass pasture allowing for additional fertilizer and overhead cost after establishment, would amount to $9.81 per acre, assuming the pasture lasted ten years.

In order to meet this annual cost of reed canary grass pasture and show a return, a farmer would have to obtain livestock production per acre greater than that shown in Table 2 during the pasture season.

Farmers when asked to estimate the livestock production they obtained from reed canary grass pasture reported a range for beef cattle of from 250 to 500 pounds per acre. Production per animal ranged from 85 pounds to 170 pounds. Milk production reported for dairy cows ranged from estimates of 1976 pounds to 4,996 pounds per acre. Production of milk per animal ranged from 658 pounds to 1665 pounds. This production reported for the reed canary pasture season must cover the cost of feed and other items of production in addition to the animal pasture cost as shown in Table 2.

TABLE 1

COST OF ESTABLISHING REED CANARY GRASS ON MUCK AREAS

Item	Charge (average)	Cost per acre (range)	Cost per acre (average)
Plowing	$5.00 per hour	$7.88—$26.42	$15.28
Disking	5.00 " "	4.00— 8.00	5.81
Drilling seed	1.50 " "	1.25— 2.50	1.94
Seed	.85 pound	3.33— 7.03	5.16
Fertilizer	.025 "	2.11— 8.40	5.76
Gas	.19 gallon	1.12— 2.34	1.75
			$35.70

TABLE 2

LIVESTOCK PRODUCTION REQUIRED TO OFFSET ESTIMATED ANNUAL COST OF REED CANARY GRASS PASTURE

Kind of livestock	Price period (years)	Aver. price rec'd by Mich. farmers (cents) Per lb.	Estimated annual cost of pasture (dollars)	Livestock prod. needed to pay annual cost (per acre) Lbs.	Production per animal per acre needed[1] (per animal) Lbs.
Beef cattle ..	1935–39	.06½	9.81	151	50
Beef cattle ..	1949	.20	9.81	49	16
Milk	1935–39	.017	9.81	577	192
Milk	1949	.039	9.81	252	84

[1]Based on 3 animal units per acre (mature cow equivalent).

Newest Aid in Rat Warfare

Condensed from the Turkey World

Arthur Towell

Food and shelter, the two requisites for maintaining a rat population, are readily available on most farms; therefore, the average farmer is faced with the serious problem of obtaining effective rat control.

Rat-proofing is advisable wherever practicable. Because many buildings cannot be effectively rat-proofed, however, additional controls must be enforced. After preliminary measures have been taken, the next step is rat baiting.

Outstanding among the rat and mouse baits now available is warfarin, the powerful substance discovered at the University of Wisconsin and developed by the Wisconsin Alumni Research Foundation. Warfarin is the lethal ingredient in more than 175 rat and mouse killers now on the market under various trade names.

Warfarin works differently than any other rodenticide ever before introduced. It is an anti-coagulant—a substance that promotes the thinning of the rodent's blood, causing death from internal hemorrhage.

Warfarin is usually made available to the rats as a cereal-type bait. Freshly ground yellow corn, corn meal, and rolled oats have all proved valuable as bait materials. Other similar food substances may be used, depending upon the local-

Reprinted by permission from the Turkey World
Mt. Morris, Illinois.

ity and the type of food currently available to the rats.

It is important that warfarin's slow action be thoroughly understood. Unlike most other poisons, warfarin acts slowly and becomes lethal only after the rat or mouse has consumed small quantities of bait over a period of days, usually five to 14.

Perhaps the outstanding advantage of warfarin's slow action is the elimination of "bait shyness" —an awareness on the part of the rat that it is consuming poison. In many instances, rats continue to eat warfarin bait right up to the time of their death. Warfarin's attractiveness makes it unnecessary to pre-bait—a requirement when using most rodent poisons.

The use of easily-constructed bait protectors simplifies warfarin baiting on the farm. The protector can be simply a 12-inch board, four feet long, fastened at an angle to the wall and floor over the bait container. A more permanent type of bait protector is the bait box—a specially-constructed box, or an adapted wooden crate having several small openings for rat entry and exit. Many persons hinge the box top and attach a hasp so that the box may be padlocked.

If baiting must be done outdoors, bait boxes should be covered with asphalt shingles, tar paper, or some other waterproof material. The bait itself is normally placed in clean, shallow containers, such as one-pound coffee tins.

Warfarin may be purchased in two forms — as a concentrated powder to be mixed with the user's own bait material, and as a ready-to-use mixed bait.

Laboratory tests have shown that turkeys and other poultry are relatively unsusceptible to warfarin bait. By taking normal precautions, then, it is possible to use warfarin bait in turkey-inhabited areas with complete safety.

The feed room, one of the major turkey farm targets of the rat, deserves special baiting attention, but every place subject to infestation should be baited. A few permanent bait stations in all areas, serve to kill newcomers and prevent the rebuilding of the rodent population.

When feed is accessible to the rats in great quantities, special attractions may prove helpful. Normally they are not necessary. The addition of a small amount of corn oil or other vegetable oil (one percent) or sugar (two percent) may increase acceptance. Different bait materials should be tried to determine which one is most appealing to the rodents.

Improving Tilth

Condensed from the Dakota Farmer

AMONG the many useful subjects covered at the last meeting of the Northwest Farm Managers Association was soil tilth, discussed by Dr. G. N. Hoffer of The American Potash Institute. Readers will be interested in his remarks on the use of legumes for correcting deterioration of soil structures:

"Rich, mellow, crumbly soil with that earthy aroma has always meant good soil tilth to growers. The term soil tilth is old, yet modern. Our forefathers knew good tilth when they saw it. Soil physicists, chemists, plant physiologists and breeders, microbiologists, fertilizer salesmen, and growers themselves have been measuring and analyzing soil tilth to find its component parts, how it is broken down, how it is built up, and what it takes to maintain it. Scientific journals have carried articles on soil profiles, structures, aggregates, porosity, gas exchanges, colloidal fractions, bacteria, molds, rhizobia, azotobacters and, none the least, earthworms. All these are interrelated and woven into the broad term 'soil tilth.'

"Any soil with good tilth is teeming with soil organisms. Whether they cause or follow good tilth, the fact remains that maintaining a favorable environment for soil organisms also maintains good tilth.

"All soil organisms need food. Active organic matter and soil minerals supply that food. They also need air, and good soil aeration is coincident with ample active organic matter. They depend on water and soils that are well supplied with active organic matter to increase water storage capacity.

"When crop residues from a rotation do not furnish the active organic matter to meet the energy needs of soil organisms, soil structures vital to good tilth go to pieces. The weight and friction of heavy machinery on soils further destroy these soil aggregates. Then drainage difficulties increase. Water absorption and storage decrease. Good soil aeration is impossible and roots of row crops cannot penetrate deeply. Erosion is encouraged, and the soil becomes difficult to manage. Crop yields and quality drop.

"To maintain good soil tilth, it

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Aberdeen, South Dakota, May 5, 1951

is imperative to bring into the rotation those crops with the corrective liming and fertilizer practices which will support abundant organic life in the soil. In some soils, a part of a year devoted to such crops suffices. In others, two or three years may be necessary to enhance and maintain the active organic matter balance for both the soil organisms and roots of the crops in rotation. Crop residues, manures, and intercrop green manures, all play important roles in this process of organic matter maintenance. They benefit the top soil, but in some cases, contribute little to the destruction of the frequent accumulations of eluviated, fine clayey materials immediately below the plow depths.

"Whenever we have excessive summer moisture or drouth, these compacted layers seriously interfere with functioning of roots and responses of plants to fertilizers. Root rots of corn plants are favored by these soil conditions. Deep-rooted legumes and grasses have been and still are the best corrective agents for these compacted soil zones. Deep-tillage machines are helpful temporarily, but the organic matter must be grown into these compacted layers to displace them permanently.

"The interest of all growers is directed to the use of legumes, or legumes and grass combinations, as corrective factors for deteriorated soil structure conditions, rather than as crops to produce hay, meat, and milk. In rotations with other crops, the use of well-fertilized biennial or perennial, deep-rooted legumes for soil tilth improvement pays big dividends.

"The reasons for these benefits are found in the fact that many soils have become depleted of organic matter, and with this loss, they are more susceptible to the soil compactions induced by heavy farm equipment in plowing and preparing the soils for commercial crops, and also in cultivating and harvesting them. It is often necessary to harvest commercial crops in their prime condition, and this means getting into the fields irrespective of the wetness of the soil. Severe damage to soil structure takes place under these conditions, as well as when the soil is extremely dry.

"Accordingly, from every standpoint, the organic matter must be maintained in these soils to take the punishment induced by these field operations. The use of a crop specifically for feeding the soil organic life may not be a very popular suggestion, particularly when all crops in the rotation are supposed to be creators of new wealth and converted into cash returns."

Significance of Bone in Cattle

Condensed from the Shorthorn World

Dr. Carl W. Gay

MEAT is casually considered as muscle only but actually a cut of meat consists of muscle, connective tissue, fat, cartilage and bone. In evaluating different cuts of meat emphasis is placed upon the maximum amount of muscle and a minimum of connective tissue. That is the chief reason the full loin and rib which constitute only 24.3 percent of the weight of the carcass represents 37.5 percent of its total value and that is why hind quarter cuts, in which the eye of beef predominates, are preferred to fore quarter cuts. The steaks and roasts from the hind quarter may be broiled or oven roasted by the application of dry heat while the fore quarter cuts, higher in connective tissue content, require special treatment with moist heat for their satisfactory preparation as pot roasting, and braising if shoulder steaks are used.

The amount of fatty tissue is the measure of fitness or the degree of finish. The long-fed steer will dress higher and yield better in carcass, the packer's principal concern, and also will provide a more juicy, flavorful steak or roast to the consumer. However, fat in excess or unevenly laid on, is discriminated against, and at current prices a liberal trim is demanded by the retail purchaser.

Even more important as a guide in the selection of retail cuts of meat is the proportion of muscle to bone. This feature is responsible for the broad demand for round steaks only a cross section (round bone) of the thigh bone being involved. There is quite a wide selection within the group of sirloin cuts depending upon the region of the pelvis included and the relative amount of bone determined thereby. Likewise the location of the chuck cut will influence the amount of bone contained, blade portions being much more bony than cross arm or round bone sections. The carver has still another reason for choosing those cuts that offer least bony interference with his carving technique. The rump, for instance, requires boning and tying to be served acceptably. Not only is the proportion of bone high but it is so irregularly disposed that no pattern of carving can be followed.

Even though both fat and bone

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have nutritive properties and should not be considered complete waste they do detract from the salability of the cuts with which they are associated if in excess. Bone is classed as an inedible product yet it is rich in important extractives which contribute a great deal to flavor. "The closer to the bone the sweeter the meat" is not altogether an erroneous idea and there are many meat gourmets who prefer the standing (bone in) to the boned and rolled rib roast for this reason.

Notwithstanding the contribution of bone to flavor it must be concluded that the less bone there is in a cut of meat the better merchandise it becomes, quality being equal, and the purpose of this article is to square this conclusion with the cattleman's position that he must have bone in his cattle either for breeding or feeding purposes. It appears to be a direct conflict of ideals to favor steaks and roasts of minimum bone while insisting that bone is an essential attribute to the steer from whose carcass of beef the steaks and roasts are to be derived. It hardly makes sense to demand something in the living steer that shall be detrimental to the carcass that steer shall yield.

A comprehensive study of the significance of bone may clarify this confusion and reconcile the conflicting objectives. Bone is a relative term. All cattle have the same number of bones arranged in identical order and manner to constitute the skeleton. When a beast is said to have "bone" the implication is that he is possessed of more than average weight and substance of bone. His cannon bone, for example, has more and larger individual bone cells, the units of bone structure, than would be found upon a microscopic examination of a section of cannon bone from a beast designated as fine in bone. In judging whether it be in the showring, in the selection of a herd sire or a carload of feeder cattle, bone is an element of size and ruggedness and an index to ultimate development in young cattle. It may be present in such extreme amounts as to result in plainness, coarseness or roughness, three degrees in which it is undesirable. On the contrary the character and amount of bone may indicate quality and refinement. If bones are deficient in weight or substance but very smooth it indicates a structure of bone with the cells densely arranged and supported by a minimum of intercellular substance comparable to the brick and mortar in a wall. In this case the wall would not be very thick but made up of high grade materials while heavy bone that is rough and coarse in texture might reveal, in histological study, an

amount of intercellular substance all out of proportion to the essential bone elements like too much mortar in the joints between the bricks. Distinction should be made between the bone of substance and the boniness of some framey cattle in which the skeleton is too much in evidence. The right sort of bone is correlated with muscle, the more of one, the greater the thickness and fulness of the other.

The most effective means of producing feeder cattle of a higher percentage of muscle to bone is to select for more natural flesh (muscle) and the best indicator of heavy muscular development is bone. This reads like the pursuit of a circle, but actually bone, the item that in carcass beef is least desirable, is the most important means to the end sought, i.e. muscle. It is much like the relative importance of underline to packer and feeder. The packer would prefer cattle of only tops and hind quarters as it is in those regions that his profit is made, much of the weight incident to the underline being sold at a loss. But the feeder buyer estimates the doing capacity or feed lot performance of cattle by depth of body, length and spread of rib and depth and fulness of flanks, even accepting one a trifle paunchy over another too trim or "one gutted." Underline, which the packer would like to by-pass, is of greatest concern to the feeder whose job is to make the cattle produce. And so it is with bone and muscle. The skeletal framework is the foundation upon which the great muscular system is mounted and there is the same balance or correlation as between any well planned foundation and the super structure that it is to bear. The necessity for this balance is shown in the fact that some bones have been fractured by sudden muscle contraction as in slipping. In such a fracture the skeletal framework was not up to the contractile power of the muscles as it should be and usually is. After consideration of this proportion between the size and volume of the muscles and the weight and substance of the bone structures from which the muscles arise and to which they are attached the reason for more than average bone in beef cattle are quite convincing. This is true up to the point of normal bone development. It does not mean that a rough, coarse boned individual heavy in the head and shoulders, prominent at hooks, pin bones and tail head, and coarse jointed will have muscular development in proportion.

Muscle is the natural flesh so important in the lean stocker and feeder cattle. It is the basis for the fattening process in that fat is deposited upon, between and within (marbling) the individual muscles. This bone-muscle relation

follows the law of diminishing returns. A parallel is feeding for production. As long as cattle continue to gain in response to increased feed allowance it pays to step them up but when more feed fails to net more pounds of gain the limit has been reached. And so as long as more bone can be relied upon as assurance of a more heavily muscled body it is an important aid in estimating a beast's efficiency both in feed lot and on packer's rail, but when the above normal bone amounts only to roughness with no compensating above normal muscular development it becomes a fault.

Bone is definitely involved with size. A fine boned steer hardly can be expected to grow large and it is unusual for a heavy boned one not to make good growth if he gets the feed. Since bone is associated so closely with size discussion might well be directed to size itself since it is such a controversial topic among beef cattle people and much difference of opinion exists within the ranks of the breeders of the three leading beef breeds. A research project is now under way at three ranking experiment stations in cooperation with a leading breed association to determine by actual feeding trials the relative capacities of small, medium and large type calves to use feed efficiently in the production of beef. Shifts in type trends in line with the times are normal and regular but the question to which cattlemen are seeking the answer is, "How far should the pendulum swing from one extreme to the other before stabilizing at a certain point?" Weight-for-age always has been of primary importance but baby beef now has the call, to a large extent, and calves for the production of baby beef must mature early and fatten rapidly so as to be finished at from 12 to 18 months. This is not the same as weight-for-age. For instance, heifers do not make as rapid gains nor weigh as much at a given age as steer calves but they are ready for market weeks in advance because of the early finish which they attain. Baby beef is favored by both the feeders and the packers. Feeders find them more economic users of feed, especially in concentrated form, some even comparing calves with hogs in the ratio of feed to gains. Packers like the quicker turnover in the handy weight carcass, the size of the modern family as well as prevailing costs and living conditions favoring the small steak or roast.

Since the qualification "baby beef" is not entirely a matter of age but also of finish and grade, there being no lower grade of baby beef than "good," early maturity and rapid fattening become cardinal items in its produc-

tion. And the pony type of cattle are likely to prove, by and large, the more responsive in these respects. Hence in selecting the early finishing sort among breeding cattle, as well as feeders, the smaller ones have inadvertently come through to the top, as it were.

Weight-for-age always will confer an important advantage on any cattle but the extent to which finish weight at early age in fat cattle should be permitted to influence the size of breeding cattle is provoking a good bit of discussion with claims and counter claims by the respective partisans within each breed as well as between breeds.

Bone in cattle has a definite index value. In the potential feeder prospect heavy bone indicates, first of all, the massive muscular system that characterizes a meaty steer showing short, thick and full in the carcass, as on foot. In the second place it is associated with a rugged, good doing sort that will give a good account of themselves in the feed lot by making sure that they get all that is coming to them at the bunk, will spend the least time off feed and be less likely to have the continuity of their gains interrupted by sickness.

In the breeding bull heavy bone is a feature of masculinity or bullishness as well as suggestive of size, ruggedness of constitutional vigor and doing capacity. Many a bull, acceptable in other respects, has been rejected as a sire for the good reason that he was too fine in bone.

However, the importance of bone should be reckoned from a conservative point of view. Extremes of either kind are undesirable. Too much bone, in addition to the rough features already described, often is found to go with a heavy hide, a paunchy, wasty middle and rolls and patches when fat, all of which may add up to a low dress and a low grade carcass. Bony, framey cattle are not only rough in appearance but they usually are hard feeders, bare of covering in important places and poor yielders in carcass. At the other extreme, too much refinement of bone, while it reflects quality as in a neat head, a mellow hide and soft hair, trimness and smoothness throughout and even fine texture of meat, also indicates a lack of those things which make for greatest productiveness in feeding cattle and highest grade when ribbed and rated on the rail. Too fine breeding cattle, bulls especially, are subject to corresponding objections.

It is not only the amount but also the character of bone that reflects the muscular development so indispensable in cattle that are to

be profitable to the feeder as well as showing th greatest cut out value ultimately. What constitutes too much or too little and just how much should be sought and of just what kind is not a matter of measurement nor of specifications. As with many other characters involved in judging cattle the pattern is in the mind's eye of the cattleman. It is entirely possible to discern but not to describe what is the proper amount and character of bone in beef cattle.

Where Do Concentrates Fit In?

Condensed from the Poultry Tribune

Dr. George M. Briggs
University of Minnesota

With the discovery of rich sources of vitamin B-12 and AFP, it is now possible to put all the important vitamins needed in a ton of poultry feed into just one small package or pre-mix. Often some of the trace minerals and amino acids also are added.

Such concentrates, in packages weighing as little as 5 pounds or as much as 100 pounds, now are being offered to poultry farmers and to feed mixers in all parts of the country. Until this time it has been very difficult, or even impossible, for farmers to buy the individual vitamins in many parts of the country.

In Minnesota, concentrates from at least 15 different companies are now available to poultry farmers. In most cases, complete directions for their use, including ration formulas for home-mixing, are offered with the concentrates and the amount of each vitamin is carefully listed. There has been a great increase in the use of such concentrates in the past year and they seem to be doing an excellent job.

In order to fully understand the proper use of pre-mixes, a brief description of the important nutrients present in them is given here.

Vitamins—Most of the supplements contain sources of the following vitamins in large amounts:

1. Riboflavin (for growth, egg production, hatchability, and prevention of curled toes and leg paralysis in chicks).

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Mt. Morris, Illinois, September, 1950

2. Vitamin D (for prevention of rickets and for good growth, egg production, strong egg shells, and hatchability).
3. Vitamin A (for growth, egg production and prevention of general weakness, sticky eyelids, and infection).
4. Vitamin B-12 (for maximum growth rate and good hatchability and livability of chicks).

These are the "big four" vitamins as far as poultry rations are concerned. These four vitamins are usually the only ones that must be considered when making poultry rations with the common feed ingredients.

Other vitamins are sometimes present in these concentrates, such as niacin, pantothenic acid, choline (or betaine), folic acid, and vitamin E. These vitamins do not need to be added to most poultry rations since they are already present in common feed ingredients. They are often included for "insurance" purposes. Also, they are important in some "high energy" broiler rations.

Minerals—A few of the concentrates that are on the market contain several of the trace minerals such as iodine, manganese, iron copper, cobalt, and zinc. Of these minerals, only iodine, for thyroxine formation, and manganese, for prevention of slipped tendon, good egg production, and egg shell strength, are ever needed in farm poultry rations.

As a general rule, it is safer to supply most minerals in separate form rather than in a vitamin supplement because of possible destruction of vitamins.

Amino Acids—Some of the concentrates also contain significant amounts of amino acids, the building stones of protein, in addition to the vitamins. However, it is well to know that amino acids also can be supplied by all protein feedstuffs, such as meat scraps, fish meal, milk by-products, soybean oil meal, and cottonseed meal.

Antibiotics—Several of the nationally advertised vitamin premixes now contain some antibiotic activity in very crude form, although the level of activity is not guaranteed. The proper use of antibiotics in poultry feeds has not been fully established as yet, and it should be kept in mind that very good feeds can be prepared without any antibiotic activity present. However, it is known that antibiotics will increase the growth rate of starting chicks and turkeys as much as 15 percent in some cases.

The amount of each nutrient is usually given on the tag of a bag of concentrate. Since there is no fixed standard for all products, it is up to the buyer to compare the level of each nutrient with the cost of the product. Prices for

enough supplement for a ton of final feed range from four to ten dollars. As a guide, the following table gives the total amount of each nutrient needed in a ton of total feed. (National Research Council figures except for vitamin B-12).

Vitamin	Starting Chicks	Laying Hens	Breeding Hens
Vitamin A units	4 million	6.6 million	6.6 million
Vitamin D units	360,000	900,000	900,000
Riboflavin milligrams	3,200	1,800	2,600
Vitamin B12 milligrams	10 to 15	known not	6 to 10

A person can easily calculate to what extent a vitamin concentrate supplies these amounts. Simply multiply the stated level of the vitamin per pound of supplement by the number of pounds of concentrate suggested by the manufacturer for a ton of feed.

Except for vitamin D, the entire amount of each vitamin does not have to be added when making poultry rations. Allowances should be given to the vitamin A that is present in dehydrated alfalfa leaf meal; the riboflavin present in various ingredients; and the vitamin B-12 in animal protein sources. Beware of supplements which do not state how much of each of the "big four" vitamins are present.

Vitamin concentrates and premixes are not intended for all poultry farmers. When one is using a manufactured poultry feed from a reliable commercial feed company according to the directions of the company, it is not necessary, or even wise, to use a concentrate in addition to the feed, under normal conditions.

At least two of the larger feed companies in the Midwest that sell commercial feeds also sell a vitamin concentrate for the purpose of adding extra vitamins to their regular laying rations when eggs are used for hatching purposes. Breeding rations are not obtainable in some areas and, as stated by one of the manufacturers, "Economical egg mashes designed for market egg production lack the necessary fortification for good hatchability."

Vitamin supplements also are often used as "boosters" or "conditioners" to normal feeds during times of stress. An example of a time when a "booster" is helpful is when a flock of birds is trying to snap out of a disease or when hens are going through a molt. Another example is when egg production slows down due to unknown causes and when consumption of feed becomes less. Keep in mind that under normal conditions, when growth and egg production are satisfactory, extra vitamin concentrates are not needed or recommended.

There are still a few poultry producers who mix their own rations, especially in the Midwest where grain is plentiful. A number

of concentrates are prepared just for the purpose of supplying all the vitamins necessary to use with home-grown grains, along with dehydrated alfalfa meal, protein feed-stuffs, and minerals. Good feed formulas, as well as a list of concentrates for use in such formulas, are obtainable from agricultural colleges.

Unless a poultryman has considerable turn-over of feed and has a good feed mixer, however, it is not recommended that he attempt to mix at home. It is much better for the average farmer who has poultry as a sideline either to buy a commercially prepared feed or to get a feed custom-mixed by his local mixer.

When a farmer or small feed mixer uses a vitamin pre-mix he can be surer that the necessary vitamins are well distributed throughout the feed than if the individual vitamins are used. Also, he does not have to keep a stock of the individual vitamins when such concentrates are used.

In conclusion, it may be said that vitamin concentrates have a definite place, although still rather limited, in the overall picture of poultry production.

What Is A Great Cow?

Condensed from the Ayrshire Digest

Prof. George W. Trimberger
Cornell University

A GREAT cow is one which has many desirable characteristics herself, belongs to a family in which the individuals uniformly possess these same desirable features, and then breeds true generation after generation. Since superior cows are reservoirs for accumulating and storing the good inheritance of great sires and great dams, both of these should be outstanding in the pedigree. The final test of a valuable genetic makeup for a superior cow is her transmitting ability to her offspring which measures the prepotency available through her reproductive system.

To properly evaluate an individual cow and her family the following are usually considered most important:

High uniform production year after year when all records are

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included. Heavy milk production combined with high test to get outstanding butterfat production. For family groups, all individuals as well as records should be considered.

Persistency of production. This is inherited and is necessary for high production.

Good type for the outstanding cow herself and her family group. This increases the sales value and productive usefulness. It provides the requirements for good wearing qualities and the udders have to meet definite standards.

Longevity. The length of a cow's life in a dairy herd has a direct effect on economic returns. Increased longevity results in high lifetime production, and many more calves for replacements. More cows are needed with a long and useful life.

Good feeding qualities and a pleasant disposition are usually inherited and have a considerable bearing on high feed consumption which is important for high production. A cow with a good disposition usually attracts more attention and receives better care. She can also withstand changes in environment better than a cow with a 'sour' disposition.

Efficient reproduction with a high breeding efficiency and good genital health. Also desirable is the ability to recover when trouble occurs.

High resistance to disease. Some individuals and families are susceptible, others are resistant to mastitis, genital infections, hoof trouble and other diseases.

High transmitting ability or prepotency for all these desirable characteristics.

The first requirement for a breeder to develop and then perpetuate superior cattle is that he be honest and deal with the facts. To properly evaluate an individual and her cow family the following are important:

a. All individuals should be included—culling out the poor ones results in a highly inflated and unreliable evaluation. Culling is desirable but should be done after the information is available and can be included for group appraisal

b. All records on each individual from a continous testing program should be included. When only high records or records from selective testing are considered, the evaluation is inflated and the breeder does not have the facts. H. I. R. (Herd Improvement Registry) testing is desirable to get complete information.

c. Permanent records must be kept which accurately describe production, type classification ratings, breeding efficiency, genital health, occurrence of disease and any other pertinent facts. These are necessary to evaluate the family, generation after generation, when the individuals them-

selves are no longer available.

d. Consider both males and females used for a series of generations to make up the genetic composition of the group and the individual.

Because of the complexity of inheritance, no strain of dairy cattle ever becomes entirely pure, but some do approach it and thus variation is reduced. When great transmitting sires are combined with superior cow families, future progress through breeding will be much more rapid and widespread than it has been in the past.

The ancestors in a cow family show what was available for the genetic makeup for a particular animal. The accomplishments of that animal itself shows what was actually obtained. The transmitting ability of the individual to the offspring further tests the desirability of the genetic composition and the prepotency available.

When future predictions are based on families rather than individuals, many errors in judgment experienced in the past will be eliminated. Breeding by families provides greater possibilities to consistently breed cattle with a higher percentage of desirable traits and a minimum of undesirable ones.

Research results and practical observations show that future herd sires possess about the same breed improvement potentialities as do proven sires themselves when the prospective sires are selected on a sound basis; this means emphasis on a pedigree which combines great transmitting sires with outstanding cow families for successive generations so the desirable genetic factors become established, fixed or concentrated in as pure a form as possible. When the selection of young sires is not on this sound basis, many breeding failures are experienced.

Progressive breeders consider groups of animals—all the daughters of bulls, not a selected few best ones and all the females in a family group, rather than individual cows. These breeders recognize the fact that individual males or females transmit more like their families than like themselves.

When future predictions and breeding programs are based on great individuals belonging to an outstanding cow family on which sires of high transmitting ability have exerted an influence, many errors in judgment experienced in the past will be eliminated and solid lines of inheritance will be formed. Superior dairy cattle are being developed and outstanding herds stabilized by this method throughout the United States. The gratifying results that are obtained attract and motivate new breeders as well as hold the interest of those that are established. The end result is to gain recognition as successful breeders.

Hand Feed for Highest Production

Condensed from New Jersey Farm and Garden

Dr. Clarence E. Lee

FOUR years of careful, large-scale, experimental work at the Beacon Poultry Research Farm, showed conclusively that the "cafeteria" system did not produce peak production either in Leghorns or heavy breeds; and that the difference in egg production resulted in a higher cost of feed per dozen eggs for the free-choice system and a lower net return per bird over feed cost.

Birds on a standard feeding program of mash, supplementary pellets, and grain, with the pellets and grain hand fed, showed in the paired pens of birds of like weight, maturity and production when housed, differences of 10.91, 27.78, 20.01, and 17.86 eggs per bird in favor of this system of feeding as against the cafeteria feeding, where mash was hopper fed and corn and oats were also hopper fed in separate hoppers. This difference was not for a full year but in the case of the first two figures shown these related to four groups of 760 Single Comb White Leghorn pullets started December 1, 1941, and run through September 21, 1942, and the second two differences applied to four pens of 800 Leghorns started October 2, 1942, and run through September 19, 1943.

These are typical of the results obtained on these experiments covering four years and 4,092 layers, and including both Leghorns and heavies.

It is true that the birds on the cafeteria system did lay well enough and that illustrates the danger of drawing conclusions simply by making observations on a group of pens all on the same program.

However, the carefully-controlled experiment indicated not only that we sacrificed some very valuable egg production, but that we also raised our cost per dozen and cut our profits thereby—and to a very material extent. Furthermore, our work showed that there was far more variability in egg yolk color with cafeteria fed grain, particularly with the heavy breeds which ate a greater proportion of grain than did the Leghorns.

It is obvious that if we allow birds to have unlimited access to corn there are many individuals

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Sea Isle City, N. J. September, 1951

that are going to eat entirely too much corn. These individuals will tend to lay eggs with much darker yolks than desired by the New York and many other Eastern markets. Likewise such individuals will eat less mash and will reduce their own protein and vitamin intake below the required amounts for best results. Furthermore, there will be much greater variability in yolk color due to variation in individual preferences of different birds.

Experiments that have been in progress at the Beacon Poultry Research Farm for the past year (unpublished material) indicate that where automatic feeders are used we can get as good production, and virtually the same cost per dozen eggs, by the use of an all-mash ration supplemented with hand fed pellets once a day, at evening. The same ration without the supplementary pellets does not do nearly as good a job. The automatic feeder leads to better feed consumption than we would otherwise get on the all-mash program.

If whole grains ever get back to normal prices we may see quite a different relationship between mash and grain prices, and in that case the all-mash ration, even with the use of the automatic feeder, may be considerably more expensive. But at the present time, and probably for some time to come, it appears likely that high grain prices will rule and this will allow economical use of properly formulated all-mash rations, with automatic feeders.

I should add that we have not yet found an automatic feeder which will take out pellets or grain fast enough, where a line of several pens is being fed from the unit, to enable all pens to secure the proper amount of the supplementary feeding. As a rule the birds close to the feeder get the lion's share and the birds on the end of the line get little or none. Furthermore, it is impossible to feed the various pens just the amount of grain or pellets which each should have, depending on their body weight and egg production. For these reasons we much prefer to give the supplementary feeding of pellets or grain, or both, by hand.

The Problems of Philippine Agriculture

Condensed from Foreign Agriculture

C. M. Purves and John C. Hobbes

WHEN the Philippine Islands became a Republic in 1946, their new status was one of mixed blessings—for with political independence came many problems of economic independence. Paramount among these problems were those of agriculture. Some agricultural problems were the result of World War II, including decreased production and reduced exports. Some of them were inherent in the Republic's rural structure, including tenancy problems, inadequate credit, and outmoded practices.

The new Republic did not deal successfully with its economic problems, and as a result they continued to worsen. They assumed such proportions in the next four years that the concern of the Philippine and United States Governments culminated, in 1950, in the dispatch of an economic mission to the Islands to "consider the economic and financial problems . . . and to recommend measures that will enable the Philippines to become and to remain self-supporting." The following article deals with the situation confronting the Mission and its recommendations.

The Republic of the Phillipines is essentially a nation of farmers. More than 70 percent of the people are directly engaged in agriculture and the value of agricultural output comprises over half of the national income. But this production is largely dependent on a peasant-type agriculture of simple tools and small farms operated under traditional handicaps. In addition, all aspects of agriculture suffer from the lingering effects of World War II and domestic unrest in which the peasant himself plays a leading role. The Philippine Government has not as yet coped effectively with these problems, and agricultural production is still below the prewar level, thus compounding the troubles besetting a young nation.

Many aspects of the national economy require overhauling, but lasting prosperity will stem from greater production by the farmer. The Filipino farmers, forming as they do the lowest economic and social strata, are poorly equipped to meet the responsibility placed

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on them. Fundamental changes are needed in the farm areas if the Philippine Republic is to become economically stable. What is more, with these changes the Philippines can become even a prosperous agricultural nation, for it has an abundance of potentially rich but undeveloped farmland.

Until its independence in 1946, the Philippines was a dependency, first of Spain and then of the United States. Its society and economy developed according to the "colonial" pattern, depending on the production of raw materials by cheap labor. Farm production came to account for about 90 percent of the value of all prewar exports. The world grew to rely on the Philippines for practically all of its Manila hemp and for much of its coconut, sugar, and tobacco; almost 35 percent of the cultivated area in the Islands was covered by these crops. The rest of the farmland was devoted to growing food for local consumption, with rice, the staple food of the Filipinos, the most important crop.

Until the war the Philippine economy maintained a favorable trade balance. But it was dependent on the export of a few raw products and, besides, was highly dependent on preferences in United States markets. Independence was already scheduled for 1946, with that status to be followed by a gradual reduction in the preferences and the beginning of a more competitive existence. Ever since 1936 plans had been in the making to prepare Philippine agriculture for the impending challenge—plans that called for more efficient and diversified production. But World War II and 4 years of Japanese occupation brought these plans to nought and shook the foundations of the Philippine economy. Commercial crop production stagnated for lack of markets. Draft animals, equipment, and processing facilities were destroyed. And through it all the farmers sought only to sustain themselves until the Americans should return.

Shortly after VJ-day the Islands assumed their independence, amidst the aftermath of war. And ever since then they have been plagued by serious economic problems, notably inflation. Civil strife, fed and guided by communists but born of homegrown grievances, has impeded normal economic, political, and social activity. True, the United States made large remittances to the Philippines after the war, but so much of the funds were spent on nonessentials that many of their expected benefits toward rehabilitation were never attained.

The saving element in the whole complex picture was the peasant, whose way of life was too simple to admit of much dis-

ruption and who continued his traditional pursuits. He, more than anything else, is responsible for the fact that in the past 4 years the physical volume of production has risen from less than half of the prewar level to within a few percent of it.

But the efforts and total production of the farmer have been insufficient for the present economic crisis. The inadequacy of the peasant's effort lies exposed in a twofold shortage: there is not enough food for the home population, nor is there enough for export to provide the means for essential imports.

First of all, production of the staple foods—rice and corn—does not meet demand. True, the greatest postwar improvement of Philippine agriculture has been the expansion of rice production. Before the war, the Philippines were almost self-sufficient in rice; but since that time the increases in population have far outpaced the increases in the rice crops. Despite a record-breaking crop in 1949, estimated at 2.5 million tons, or roughly 6 percent more than the prewar average, about 11 percent of domestic requirements had to be imported. The 1950 crop was slightly larger than in the previous years, but per capita rice production was still less than 90 percent of the prewar figure.

As for corn—the Philippines' second most important staple—considerable recovery has also been made since the war, but per capita domestic supplies in 1949 were only 80 percent of what they had been in 1940. Although the production and consumption of corn is highest in the Visayan Islands, the center of the Philippine archipelago, it is a secondary crop in many other areas. A brighter note in the diet picture rises from an expanding production of the many minor food crops —sweetpotatoes, cassava, and a variety of vegetables and pulses. But, even as before the war, the Filipino diet is still deficient in fruits and meats.

The depletion of the livestock population during the war has posed serious problems. The shortage of caraboas (water buffalo) and cattle, which traditionally supply most of the draft power, has seriously affected crop production. It will probably not be until 1953 that the number of draft animals reaches the prewar level. The greatest decrease has occurred in the beef herds that grazed on the extensive range land on some of the southern islands; in 1949 they were only half as numerous as they had been in 1940. Farmers report that meat prices are so high that they hesitate to save their breeding stock; and the shortage of credit further discourages them in building up their herds. Before a vigorous cattle industry can be established

in the Philippines, there must first be a sound breeding program, for the native cattle are inferior and the European cattle do not thrive in that area. The dairy industry, which also needs a breeding program, has a further deterrent—there is a shortage of grazing land near the cities. Dairy products are consumed mainly by the upper classes and are mostly imported.

Swine and poultry have made a more rapid recovery. By 1950 they were believed to have approached their prewar numbers. But even this increase permits the rural people only an occasional feast of pork or poultry—not enough for a proper diet. Most farmers raise a few hogs and chickens, which feed on kitchen refuse and left-overs from the fields. They are a convenient adjunct to Filipino farm life but are far from a solution to the Philippine meat shortage. Millions of pesos are still spent on imports of meat and dairy products.

Not only is production of food crops for local consumption falling behind needs. Lagging production of export crops also is of great concern to the Philippine Government. Only recently, and by virtue of import controls, has the trade balance become favorable. Coconuts are the only export crop that has returned to the prewar level. Exports of coconut products are far above prewar and these items have been the leading export since the war. These products and sugar, abaca (Manila hemp), tobacco, and pineapples will continue to supply the bulk of Philippine foreign exchange.

Sugar was formerly the Philippines largest export item, comprising more than 40 percent of the value of all exports in 1936–40. In 1940, about 1.1 million short tons was produced on 565,000 acres. During the war, however, the area planted to sugar declined, and some mills were destroyed. Sugar production is almost back to normal on the Island of Negros but not in the former producing areas of Luzon, where civil strife has made most planters reluctant to operate. Too, rice has been a more profitable crop than sugar and is being planted in place of it. Another depressing influence has been the continued controversy between sugar planters and millers, a controversy that has further precluded tranquillity in the sugar industry.

Although the sugar industry has recovered somewhat since 1946, the quantities of sugar available for export in 1950–51 will be only 75 percent of the duty-free United States quota accorded the Philippines in the Trade Act of 1946. Only by reducing costs, primarily through raising yields, will the Philippine industry be able to absorb the gradually increasing United States import duty beginning in 1954 and to actively com-

pete on a price basis in markets not protected by trade agreement. The Philippines is a relatively high-cost producer. At the present time the varieties of cane commonly planted yield less than half as much as the best varieties in Indonesia.

Production of abaca fiber, a major export and a virtual Philippine monopoly, is still below the prewar output of 1.3 million export bales (of 2,783 pounds). Before the war, in Davao, the principal producing area, most of the abaca was produced under the supervision of the Japanese. After the war, the Japanese were evicted and into the vacuum came persons who had only a short-term interest in the already deteriorated plantations. As a result, cutting was excessive, reducing future production, and management was inefficient, permitting the invasion of the dreaded mosaic disease, which soon became widespread. While production has increased from 393,000 bales in 1946 to 525,000 in 1949, it is not likely that output can again reach prewar levels until this serious virus disease is brought under control and cultural methods improved.

Tobacco production was a thriving Philippine industry before the war, ranking fourth as an export crop. During 1935–39 the average area planted to tobacco was 176,000 acres, which produced about 74.8 million pounds a year, more than 70 percent of which came from Northern Luzon. At that time, tobacco exports averaged more than 37 million pounds a year. The United States was formerly the leading foreign customer for Philippine cigars while Spain and other European countries were principal markets for leaf tobacco.

A variety of adversities beset the tobacco industry following the war. Owing to inflation, production costs have become so high that Philippine cigars and tobacco cannot compete in world markets, and in many areas the high price of rice and other food crops now makes it more profitable for farmers to grow these than a tobacco crop.

Moreover, within the Philippines, preference has swung to American tobacco products. The Government has attempted to protect domestic growers by imposing drastic import controls and by buying domestic tobaccos at high prices. Some recovery in production is forecast for 1949–50. Further recovery in the tobacco industry may occur, but it will doubtless be at the expense of the native consumers, who will pay even higher prices for tobacco products.

Of all the major export crops, coconuts were the least affected by the war. Most of the 2.5 million acres devoted to coconuts are located in Southern Luzon, north-

ern Mindanao, the Visayan Islands. Copra exports accounted for about 29 percent of the value of prewar Philippine exports and provided a large part of the vegetable oils in world trade. Philippine copra is generally inferior in quality to that of other exporting countries, but, because of a duty preference, most of it moves to the United States, where it is mainly for industrial purposes.

Pineapple exports have assumed greater importance since the war. In 1949 they aggregated more than 50,000 short tons, as compared with 20,000 tons in 1940. Practically all of these pineapples are produced on one large American estate in Mindanao.

A variety of other crops—sisal, coffee, cacao, derris, ramie—are grown on a small scale, but expanded production of these is urged by advocates of a more diversified agriculture. As it is, prosperity in the Philippines is largely subject to vagaries in the world market for a few export commodities and is, therefore, influenced by factors over which the Filipinos have little control. Expanded production of additional crops would reduce this risk. Also, some of the items that loom large among Philippine imports could be produced domestically to a greater extent. Among these are meats and dairy products and fibers for bagging. Too, the Filipino diet would benefit by increased fruit consumption. The diversification of agriculture offers advantages; it will, however, be a slow process.

The peasants themselves, along with the social and economic institutions that encumber them, combine to create a rather enigmatic situation standing in the way of the attainment of a healthy agricultural industry. Some of these handicaps rest within the farmers themselves: illiteracy and faith in outmoded practices. Others, stem from the inequities dealt them by other segments of society: the landlords, the money lenders, and the merchants. Thus, the Filipino farmer is in a poor position to accomplish more in the future than he has in the past. Lacking in organizations of their own and having only tenuous contact with other classes, these farmers comprise a difficult medium through which to convey modern agricultural techniques to the ultimate target: the farmland. Even if they are shown what to do, most of the farmers are so poor that it is difficult for them to apply their knowledge. The problem is greater than a mere lack of "know how."

TENANCY. Of the several adverse agrarian relationships besetting Philippine agriculture, none is so severe as the high rate of tenancy. Through the years, much of the best land in the Islands has found its way into the hands of a

few, who have exploited by parcelling it out to tenants in small plots at exorbitant rents.

According to the 1939 census, tenants comprised a minimum of 30 percent of all Filipino farmers and in some provinces—particularly in the "rice bowl" of Central Luzon—more than 60 percent found themselves in that group.

A common arrangement under the tenancy system as it operates in the Philippines is for the tenant to contribute the labor, the work animals, and half the cost of transplanting and harvesting—and then to turn over half the crop to the landlord. This demand upon him keeps the farmer in perpetual poverty and increasingly dependent on loans drawing exorbitant interest. As a result, many tenants spend a lifetime in debt, and it is not uncommon for children to inherit their elders' obligations. Tenancy contracts are so frequently ignored at the option of the landlord that they offer the tenant little security on the land. In brief, the landlords have acquired all the bargaining advantages, and the tenants, who can live only by farming, must make the best of the situation.

The system diminishes any incentive to greater production and is an obstacle to the widespread acceptance of better farming methods. The tenant is reluctant to make improvements on another man's land from which he may be arbitrarily evicted. Also, the tenant is reluctant to invest additional time and effort in greater production when much of the increment goes to the landlord. On the other hand, the landlords live better and are less urgently concerned in such matters. Tension between tenants and landlords has grown so that agreement between them on how to share the burden is difficult and rarely achieved.

Efforts to remedy the landlord-tenant relationships have thus far been ineffective. The most recent palliative legislation was the "70-30" law, passed in 1946. In general, it provided that the tenant's share of a crop would be increased to 70 percent, and the landlords' reduced to 30 percent. In practice, this law has been widely evaded and ignored.

Farm Credit and Marketing. Perpetual debt and the shortage of farm credit at reasonable terms is a serious problem in the Philippines. Loans from the money lender, the merchant, and, in the case of tenants, from the landlord, are readily available to the peasant, but they draw extremely high interest and create more problems than they solve. Bank loans are theoretically available to peasants and offer better interest rates, but they are so bound by red tape and security requirements that they are generally out of the reach of poor farmers. For

lack of alternative, it is the private sources of credit that are patronized almost exclusively.

The shortage of credit at fair interest rates is serious in itself, but it is inextricably related to the problems of tenancy and rural marketing. The shortage of credit has been an important factor in increasing the extent of tenancy and in binding the tenant to the landlord. Even owner-farmers suffer, for they frequently must pledge their crops to merchants in return for loans and in this way are generally deprived of a full return for their produce. Practically none of the borrowed money is invested in improving the farm enterprise, since the cost of credit is in excess of any profit that might possibly result. Thus, improved farm credit may be regarded as a sort of keystone in building a better farm economy. It must be provided in adequate quantities at reasonable rates if the full productive potential of the peasants is to be put to work.

The marketing system in the rural communities is another depressing influence on agriculture. Loans accepted from merchants generally restrict the producer's choice of buyer and his bargaining power. But even where the debtor-creditor relationship does not exist between grower and buyer, other factors conspire to deprive the small grower of a large part of the market price of his goods. Among these factors are many middlemen, inadequate storage facilities, a lack of recognized grades, and insufficient knowledge of marketing conditions. As a result, the farmer pays high prices for what he buys and receives low prices for what he sells.

Farmers' cooperatives have been rather unsuccessful in the Philippines and there is now little enthusiasm for them. Government efforts have as yet done little to improve the marketing system although the prices of some commodities have been somewhat improved by direct Government intervention. For the most part, the marketing system continues to operate in much the same way as tenancy and usury in depriving the farmer of a full return for his labor.

Unescapable poverty, and the lack of interest in the tenants' welfare on the part of the landlord class, are high among the causes of the domestic unrest that is widespread in the Islands. The fact is evidenced by the communist-led Hukbalahap movement centering in Central Luzon, the region where tenancy and poverty are most severe. With a few exceptions the case of the tenant has been espoused only by the "Huks," who have found in the tenancy system most of their impetus. And that impetus is such that a good deal of the countryside is contin-

ually threatened by bloodshed. The Government continues to expend much of its budget in attempts to quell the outlawed "Huks," but the movement shows no signs of subsiding.

The problems of agrarian relationships are of practical concern in connection with efforts to increase production through the use of improved farming practices. The average farmer is too poor to invest much in the accouterments of modern production techniques —fertilizers, pesticides, and so forth—nor in concomitant capital investments such as equipment, livestock, buildings, and other improvements. Thus, not only must the peasants be given "know how," but they must also be enabled to finance its application where it can bear fruit—on the farmland.

One of the major limitations on Philippine agriculture is the small importance and slight dignity that has been accorded it. The Government has devoted little attention to agricultural problems. Appropriations for the benefit of agriculture for the fiscal year 1951 amounted to less than one-fourth of 1 percent of the total budget, an amount not commensurate with the importance of agriculture to the nation. Most of this goes into overhead expenses, leaving but a minor part for the actual operations. Little provision has been made to carry out the research needed to produce more efficient techniques adapted to the Islands. And then, only a small part of the findings that have been generated by the limited research facilities have been carried from the laboratories to the farm by the poorly organized and ineffective extension service.

A hopeful note is struck by the fact that there is a great deal of interest and support given to education in the Philippines. Literacy is low among Filipino farmers although not so low as in some other parts of Asia. School facilities are not as yet adequate but much effort is going toward raising the level of education in the Islands. Also, the College of Agriculture at Los Banos is highly regarded, although it suffered much during the war.

On the other hand, an education in agriculture is regarded by Filipino youth as the poorest and last alternative. Once an education in agriculture is obtained, the recipient usually seeks to disassociate himself from the farmer as far as possible. This attitude is due not only to the cultural aversion to agriculture in Asia, but also to the dearth of adequately paid jobs in that field. As a result, there is a shortage of trained manpower in the Government to cope with, or even understand, agricultural problems. Another result of this tendency is

that no middle-class group has developed to fill the void between the aristocracy and the Filipino farmer.

While it is evident that greater production can be obtained by solving the problems pervading the present farm area, even greater prosperity can be reached by developing the large areas of potentially rich farmland that now lie idle throughout the Philippines. It is paradoxical that this situation exists in view of the tenancy and population congestion that are found in some regions. Yet, according to some estimates, such areas in Mindanao and other southern islands are the equivalent of the present cultivated area. Abaca producers are especially eager to move into such virgin land as a means of escaping the mosaic disease. All crops now grown in the Philippines may be grown on such land, which constitutes an immeasurably valuable asset.

Many obstacles impede the exploitation of these areas. Swamps must be drained, forests cleared, and malaria brought under control. The noxious *cogon* grass that covers the open plains must be eradicated. To do many of these things, large investments in tractors and heavy equipment are required.

Another deterring influence is the difficulty of obtaining secure titles to the land. In many cases, land records were lost during the war and at present the cost of obtaining titles is often not worth the effort. Litigation over land disputes now clogs the courts while "squatters" occupy land claimed by others, thus adding to the chaos.

Until clear title is established, such land cannot be offered as security for loans. Thus, the preexisting shortage of investment capital is aggravated. The required machinery and labor can hardly be financed except by the Philippine Government.

The Government has not as yet solved these problems, and its own resettlement programs have been on a small scale. The Filipinos are innately hesitant to go into strange areas and, once there, need considerable assistance in getting established. Roads, markets, schools, and related necessities have not been adequately provided. Thus, the development of these potentially rich lands has been delayed for lack of hands to till them. It may be assumed, though, that these areas will be fully exploited eventually. The question is—will it be done in time to aid the Philippine economy in its present critical condition?

There is little doubt that small farms will continue to typify Philippine agriculture for some time to come. It is, therefore, unlikely that the average farm

could profitably use tractors and such equipment in view of their high cost and the present abundance of labor. Rather, it is more likely that the simple implements already familiar to the farmer will be improved upon and that more efficient production will come from these.

It is evident, then, that greater production is possible in the Philippines through better use of the present cultivated area and exploitation of the rich lands that now lie idle. Achieving this, the new Republic can "become and remain self-supporting." It is toward this end that the Bell Mission has made the following recommendations regarding agriculture:

1. Emergency action should be taken to deal with the plant disease affecting abaca production, and arrangements made to provide disease-free seed for new plantings. The improvement and expansion of all export crops should be encouraged and additional efforts should be made to bring the Kadang-Kadang disease of the coconut under control. Money now collected and available in the sugar adjustment and stabilization fund should be made available for research in methods of improving production. The possibilities of developing varieties of tobacco more suitable to export needs and for use in domestic cigarette production should be studied.

2. The deficit in the production of food grains is critical. Production of major items could be quickly expanded by adopting improved methods for which information is already available and by the additional use of fertilizer. Funds should be made available for importing fertilizer and irrigation equipment to expand rice and corn production.

3. Greater diversification in agriculture should be achieved by increasing production of crops for commercial use at home and for export. The livestock improvement program of the Bureau of Animal Industry and the breeding program of the College of Agriculture should be given greater support by the Government. The use of by-products for animal feeds should be emphasized and the raising of poultry and pigs encouraged.

4. The Philippine budget should make adequate provision for experimental work, extension service and technical and vocational education in agriculture. The College of Agriculture at Los Banos should be rehabilitated, a central experiment station located at the college and equipped with facilities to carry on the necessary research for agricultural development. Specialized experiment stations should be established in suitable places through-

out the country.

5. The Department of Agriculture and Natural Resources should study the problems of land use, land clearance and settlement, irrigation and drainage. The projects of the Philippine Government for agricultural development should be given detailed consideration before they are inaugurated. The Government corporations set up to deal with agricultural production should be liquidated and their functions transferred to the Department of Agricultural and Natural Resources.

6. Laws providing for the division of crops between the tenant and landlord should be amended and enforced to see that the tenant receives an equitable share of the crop for his labors. At the same time, the landlord should receive sufficient return to see that he is interested in improving his land. A broad program should be inaugurated of acquiring large estates at fair value for resale in small holdings to tillers of the soil. New lands should be opened for settlement by homesteaders and their titles promptly cleared. The administration of public lands and the procedures for land-title registration should be thoroughly overhauled. Cadastral surveys should be completed and courts of claims set up to handle land cases exclusively.

7. Rural banks should be established to provide credit for agricultural production. Loans should be available both to small land owners and to responsible tenants. The rate of interest should be moderate, approximately the same as commercial banks charge for larger loans to agricultural producers in a strong financial position. A farm management service should be operated in connection with rural banks to provide farmers with advice on financial problems.

8. Economic and technical assistance should continue to be furnished the Bureau of Fisheries. With the research already conducted by the Fish and Wildlife Service, a small staff of technical assistants would aid materially further development of the fishing industry.

9. A forest products laboratory should be established to test and develop uses for forest products and a pilot plant built to help develop quinine production. Additional appropriations should be given the Forestry Service to place timber cutting on a sustained yield basis and to prevent settling on lands adapted only to timber production.

Recognizing the plight of the Filipino farmer, the Mission stated "We cannot say that what has been accomplished since 1946 lends any great hope that Philippine agriculture will go very much beyond its status in 1940 unless

some new impetus comes in to encourage the use of improved methods of production and make their use worthwhile to the farmers who adopt them." A "new impetus" throughout the Philippine countryside is called for if the Philippine agriculture is to shake free of the problems plaguing it and to discharge its responsibilities to the economy. The Philippines must give more attention to its agriculture for in its struggle for lasting economic prosperity the farmland is the battleground and the farmer the foot soldier.

Keep Your Hired Man

Condensed from the Nebraska Farmer

Jim Boan

MANPOWER is being siphoned off farms to the armed forces and high-pay industry at the rate of more than 1,300 workers each day.

Many World War II veterans did not return to agriculture. A recent survey revealed that nearly half the men on farms are over 50 years old.

The pressure for help may soon stiffen to real competition. Here are some things you can do to help keep your hired man.

Dairy: If dairying is your major source of income, a lot of time is spent with chores. Be sure time isn't wasted. Plan to do your work without backtracking. Travel in a circle. Don't go to the cows; let them come to you for both feed and milking. Make your time go farther, and you can afford to pay a hired man more. You may want to try a bonus of from three to six percent of the milk check. Another incentive payment is to give from 20 cents to $1 per can of milk produced above the herd average. Other farmers pay from $1 to $3 for each calf weaned. Some pay a premium based on quality milk.

Beef Cattle: Some farmers and ranchers are paying hired men a bonus of 50 cents per hundred pounds of beef gained. Others emphasize the calf crop. Successful bonuses have been from $1 to $3 for each calf weaned, or one-half the net increase for all over an 80 percent calf crop. F. J. Chase, Nebraska economist, says it is quite common for ranchers to let their hired hand run a few head of cattle of their own. He states

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Lincoln, Nebraska, August 18, 1951

that Cherry County Agent R. B. Herrington knows ranchers who are paying faithful employees five percent of the net beef income.

Hogs: Most pork producing incentives are based on the pig crop. Common bonus payments are: Fifty cents for each pig weaned; $4 to $6 for every sow that weans seven or more pigs; a flat sum for all over 240 pounds per litter at eight weeks. Another bonus plan is five to 10 percent of the hog income, hogs kept in the herd considered. An Iowa farmer lets his hired man pick a sow for a "bonus litter" about two months before farrowing. "The sow," the farmer says, "always has more pigs than the average, and my hired man gives them exceptional care. The bonus amounts to from $300 to $400 a year.

Poultry: Bonus for hired help may be from five to 10 cents per dozen above an average of 12 dozen eggs per hen per year. Five to 10 percent of the egg sales is another plan. However, most farmers let their hired help develop a small poultry flock of their own or furnish them with from two to five dozen eggs a week as a bonus in addition to wages.

Sheep: Here the incentive is usually on the lamb crop. Some sheepmen pay from $1 to $2 for each lamb above one per ewe. Also, the incentive could be placed on producing clean wool.

Grain: From 25 to 50 cents a bushel above the farm average is a common bonus.

Hay: In addition to regular wages, perhaps 50 cents a ton would be paid for hay that is harvested ahead of rain. Chase, University of Nebraska, says ranchers sometimes pay 10 to 15 cents a stack bonus for prairie hay.

A progressive bonus encourages good farm hands to stay. It might work like this: In addition to a going wage, a $5 a month bonus is paid the second year—and $6.25 a month the third and fourth years. In addition to the $6.25 a month, three percent of the net taxable income would be paid to the hired man from the fifth to the seventh years. For eight or more years, 10 percent of the income or $500, whichever is greater, would be the bonus payment.

Some economists say an agreement should be drawn up between the farmer and his hired man which is signed and notarized. Others don't believe such drastic measures are necessary. But all agree that a comprehensive written agreement would solve difficulties before they start. And it's a good idea for the hired man's wife to be present when the agreement is drawn.

Here are some things the farm owner can do to "get along" and make labor go farther. Make a farm labor calendar for each week. If machinery breaks down or a shower stops work, have in mind the next job. Keep machinery ready to go; use it as much as you can. In slack periods do not leave work for

Wage Agreement Between A Farm Operator and Farm Employee

I. Wages per month from March 1, 1951, to March 1, 1952. $110 per month. $55 to be paid the 15th and $55 to be paid the last day of each month.

II. Extras:
Eggs: three dozen per week
Milk: three quarts per day
Meat: two 225 lb. hogs per year for butchering. One for each six-month period.

III. Electricity: Separate meter.

IV. House, garden and potato patch for own use.

V. Chore together every Sunday morning. Chores to be done every other Sunday evening alone.

VI. Bonus:
A. 5% of egg receipts
B. 5% of cream receipts
C. 3% of butcher hog receipts
1. Employer reserves the right to keep an equal number of gilts for sows as in spring of 1951. (20)
2. Hogs butchered for home use are not to be counted in the bonus.
3. Feed purchased will be deducted from gross sales prior to figuring the bonus.

VII. Bonus will be paid March 1, 1952, providing the employee has stayed on for the full year. (Christmas bonus is often desirable.) In case of illness, employee will receive a proportionate share of the bonus according to time worked.

VIII. If any butcher hogs remain to be sold after March 1, 1952, the bonus on them will be paid at the time of sale.

IX. The bonus is guaranteed to average $15 per month until March 1, 1952

tomorrow which can be done today. In rush periods do not do work today which can be done tomorrow. High yields per acre or per head stretch labor. Inspire the hired man to watch for labor-saving ideas.

You can do a lot in other ways than increasing wages or paying bonuses. One man interested his hired hand in the local church, school and civic groups. Another carried insurance for the hired man and his family. Still others give improved houses, choice garden spots and other non-money forms of better living. You can give a vacation with pay, or time off for personal affairs. Perhaps you can take your hired man to a purebred sale, to the Farm and Home Week at the agricultural college or to the state fair. Some farmers give the livestock prize money from the fairs to their help as a bonus.

Above all, be a good boss. Impress your help with the importance of each job; give praise for good work. Criticize constructively; adjust the severity of your criticism to the attitude of the man. Be consistent and fair. Do not hold resentment. Be a friend to your hired help.

Learn How to Farm the Hills

Condensed from Capper's Farmer

James W. Gooch

It's easier to sell field cultivators than turning plows in Trempealeau county, Wisconsin. If an implement will cut or tear thru sod without turning it over, the hill farmers will buy it on sight. But not a plow.

Trempealeau county farmers got interested in pasture renovation 3 years ago. More than 8,000 acres of their bluegrass sod have since been cultivated, fertilized and seeded to oats, grasses and legumes.

Renovation was the only hope for many of the dairymen and livestock producers who had tried for years to get cover on their 10 to 25 percent slopes. They had tried plowing around and up and down the hills. Soil would either dry out or gully-washers would

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carry topsoil, seed and fertilizer away before oats or legumes could take root.

Once they were sold on the new method of soil handling, the Wisconsin farmers went into action. Neighborhood meetings were called, and men, women and children turned out to discuss pasture renovation. County Agent Tim C. Main, demonstrated field cultivators and cultipackers—new implements needed to tear up the sod so it would store moisture in fall, then pack the soil into a firm seedbed next spring. Many operators needed more livestock to utilize the extra pasture and hay.

All such problems were threshed out at these evening sessions. A soil conservation movie and a serving of coffee and doughnuts followed the discussion periods. Three thousand farm folks have attended 35 of these meetings in the last 3 years. At each gathering, the county agent handed out folders containing the step-by-step formula for getting a pasture crop on the stubborn hills.

When asked if it pays to renovate, Main quoted production figures from a recent study made in nearby Richland county, Wisconsin. Less than $30 worth of seed and fertilizer increased hay production 6¾ tons an acre over a 3-year period. This meant an extra 2¼ tons of hay each year from hill land.

The Trempealeau county system calls for a soil test and a lime application in the late summer or early fall before renovation starts. Lime is worked into the soil at the same time sod is torn apart. In early fall sod is cut 2 ways with a sharp straight disk. It is then worked to a depth of 5 or 6 inches with a field cultivator. Main says it is important that a field be dug on the contour just before the first hard winter freeze. It is cultivated again early the next spring, before the application of fertilizer and the seeding of oats, legumes and brome grass. The seeding is followed by a drag or a packer.

Trempealeau county farmers have found it best to avoid overgrazing the new alfalfa, red clover and brome seedings, especially during the first year. The oats are either pastured off or harvested for grain. The renovated area is fenced and is grazed only a few weeks, from the middle of August until early September. Second year the clovers and grass can be pastured, cut for hay or chopped for silage.

The switch from plows to renovating implements has boosted grass production so much that Main is now busy distributing information on grass silage. When Arthur Schaller bought a field chopper and filled his silo with alfalfa and brome 4 years ago, he was one of the first in the county to try grass silage. Last year, Schaller chopped grass for filling

21 silos around his neighborhood.

Andrew Pientok started renovating the hill pastures on his 200-acre farm in 1946. Now he fills his silo with grass and needs to plant only 15 acres of his most level land to corn. Pientok has so much pasture and hay that he turns under a lush growth of alfalfa before corn. This allows him to save barnyard manure for thin spots on the hills. The alfalfa and brome pasture prevents the late-summer milk slump—an annual occurrence when his cows were running on native grasses.

Dairyman Harland Schaefer says pasture renovation has tripled carrying capacity on his 160-acre farm in the last 4 years.

Trempealeau county landowners want to be sure their children don't forget the hard-earned lesson they have learned about hill farming. That's why all grammar-school students in the county get at least one course in soil conservation. Students visit a farm each spring to study soil type, measure slope and erosion and work out a farm plan.

Cull Your Low-Producing Cows

Condensed from The Agricultural Situation

M. S. Parsons
Bureau of Agricultural Economics

EVERY dairy farmer has the problem of deciding when individual cows are no longer profitable and should be removed from the herd. The size of this problem is shown by the fact that in market milk areas such as the Northeast around 20 percent of the cows are culled annually. The percentage runs higher for some areas and for some farms.

Many of the cows removed are sterile, diseased, or otherwise unfit for further milk production. But a sizable proportion of those culled, perhaps as high as 20–25 percent, are removed because of low production. This is the group that requires a well-considered decision by the farm operator.

Some farmers approach the problem from the point of view that cost of feed is one-half of the total cost of producing milk. And going on from there they sometimes conclude that a cow must return twice the value of her feed

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in order to be worth keeping in the herd. This conclusion needs to be examined as to whether or not it is a good one.

Cost studies made by the State experiment stations, many of them in cooperation with the Bureau of Agricultural Economics, tend to bear out the "one-half" rule in the sense that in nearly every case when all farms studied are thrown together, the averages show feed to be roughly one-half of the total cost. This is true for different periods of time and for widely scattered areas. It is significant, however, that the averages for different studies vary enough around the one-half point to indicate that it is only a rough measure, even when considering the average of large groups of farms and large numbers of cows.

Granting that the "one-half" rule is a rough measure for large groups of farms and cows, the question still remains as to how well it would apply to individual cows. The cost information mentioned above indicates that although the "one-half" rule will apply on the average to some groups of farms, it will not apply to others, and that the application of the rule to an individual cow is open to serious question.

Actually, however, as a basis for farming decisions, other weaknesses in the rule are more important than those pointed out above. As mentioned earlier, the conclusion is sometimes drawn, based on the "one-half" rule, that a cow must return twice the value of feed consumed to be worth keeping. This is a very questionable conclusion even if feed costs are exactly 50 percent of the total. The main reason is the fact that many of the inputs going into milk production have no other use, at least in the short run.

For example, labor is an important cost in milk production, amounting to about one-third of the total as ordinarily computed. Yet most of the labor on a typical dairy farm is that of the operator and his family, and often has no alternative use that will produce any income except more leisure time. Under these conditions, a farmer may be much better off with a relatively low producing cow than without her, even though the cow is unprofitable by the "one-half" rule.

Suppose, for example, that a farmer has a cow producing 6,000 pounds of 4 percent milk a year, which is about average production for many of the dairy States. At prices fairly typical of recent years, feed costs would amount to $170 and total returns to $300. Applying the "one-half" rule, total costs would be $340, leaving the farmer with a net loss of $40 on the cow. Presumably, then, this cow should be culled, but before drawing that conclusion let

us look at the effect on receipts and expenses. If he disposes of the cow, his gross income would be reduced by $300. Some of the expenses which are ordinarily considered as cost items would be reduced or eliminated but not all of them. Under most conditions, the reduction in expenses would be about as follows:

Grain, 1.3 tons	$ 94
Hay, 2.8 tons	51
Milk hauling	12
Depreciation on cow	11
Dairy supplies and services	14
Miscelleneous	14
Total reduction	196

This assumes that hay and homegrown grain can be sold at going prices, but that silage and pasture cannot. No reduction in labor costs is allowed on the reasonable assumption that the labor freed in handling one cow is not likely to find other productive employment, at least in the short run.

Thus, the result is a reduction in gross income of $300, a reduction in expenses of about $200, and a reduction in net income of around $100. In other words, the farmer would be considerably better off financially by keeping the cow even though the "one-half" rule would indicate otherwise.

Other weaknesses of the "one-half" rule are due to the fact that it is based on certain assumptions which are questionable although usually unstated. Perhaps the most important of these is the assumption that the cows to which the rule apply are being fed at the most profitable rates. Actually this may or may not be true, and in most cases probably is not. Dairy cows under average management tend to be underfed, particularly in certain seasons of the year. When a cow fails to meet the "one-half" test, the chief reason may be improper feeding. With improved feeding, both milk production and feed costs would increase but ordinarily the value of the increased milk would far exceed the cost of the increased feed. This is because an underfed cow can be expected to make a relatively large response in milk production to an increase in feed intake. The same weakness, of course, could creep into the receipts and expenses approach, but is much less likely since the more detailed data used there provide the basis for a good check on the best rate of feeding.

What the rule really brings out is the well recognized fact that low producing cows are generally less profitable than high-producing cows. The farmer in question probably would benefit by replacing the 6,000-pound cow with an 8,000-pound cow if he could raise or purchase one at reasonable cost, but this is quite a different adjustment than merely eliminating the low producer.

This does not deny that some cows produce so little milk that they should be eliminated from

the herd even without a replacement in sight. But a safer way to find such cows is by the type of analysis built around changes in receipts and expenses rather than by the "one-half" rule. And this type of analysis can easily be applied by any farmer who keeps records on milk produced and on feed used.

Restoring Nitrogen Losses

Four tons of nitrogen spread over 80 acres of corn land would seem to be a pretty heavy application, yet that is the estimated amount that the average corn crop takes from those 80 acres each year. Barley, wheat, or oats run the soil down at the rate of about 50 pounds a year, while sorghum gobbles up an estimated 110 to 115 pounds per acre.

Soil depletion, however, need not be that rapid. At the recent Agronomy Field Day at South Dakota State College, farmers were told that in nine years of tillage experiments a total of 200 pounds of nitrogen was lost per acre, because straw residue had been plowed under. When the straw was not returned to the soil, 540 pounds of nitrogen per acre had been lost.

Further, said Dr. Leo Puhr, agronomist, the highest yielding oat plot in the fertility experiments was the one in which the organic material had been returned. This gives the most efficient use of fertilizer, Dr. Puhr said.

Clover Restores It

Restoring lost nitrogen does not mean, he said, that the land owner must spread that large amount on the surface. A good crop of sweet clover will turn the trick, balancing in one year what corn had taken out the previous season. Sweet clover returns 100 pounds of nitrogen a year per acre, the same amount as that taken out by corn, and in a rotation of sweet clover, corn, wheat, the fertility of the soil can be maintained by plowing under sweet clover every three years.

Grasses also increase crop yields, Dr. Puhr said, but don't store up nitrogen like the legumes do.

—*The Dakota Farmer*

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